09-24-03

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appellant : Mark D. Conover

Docket no. 2134

Serial no : 09/168,644

Filed : October 8, 1998

For : ENCODING A STILL IMAGE INTO COMPRESSED VIDEO

Art Unit : 2613

Examiner: Richard Lee

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
Post Office Box 1450
Alexandria, Virginia 22313-1450

APPEAL BRIEF TRANSMITTAL

Enclosed herewith are three (3) copies of an Appeal Brief for this patent application together with a check in the amount of the small entity fee for filing a brief in support of an appeal.

If any additional fee is required, the Commissioner for Patents is hereby authorized to charge any deficiency or credit any surplus in any relevant fee to Deposit Account No. 19-0735.

Respectfully submitted

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Dated: 22 September 2003

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SECOND APPEAL BRIEF

Pursuant to 37 C.F.R. § 1.192, through his undersigned attorney the Appellant submits, for a second time in triplicate, an appeal brief.

Real Party in Interest

The real party in interest is Pixel Tools Corporation, a California Corporation having an office at 10721 Wunderlich Drive, Cupertino, California 95015.

Related Appeals and Interferences

Appellant is unaware of any presently pending appeal or interference that is related to this appeal.

Status of the Claims

Claims 1-7 are pending in this application, claims 1-7 have been finally rejected, and that rejection of claims is being appealed.

Status of Amendments

After an Examiner's Action, Paper No. 5 mailed June 8, 2001, finally rejected claims 1-7 under 35 U.S.C. § 103(a) based upon a combination of:

1. United States Patent no. 5,689,589 entitled "Data Compression for Palettized Video Images" which issued on an application filed December 1, 1994, by Michael J. Gormish and Martin P. Boliek ("the Gormish, et al. patent"):

   a. in view of:

i. United States Patent no. 5,404,446 entitled "Dual Buffer Video Display System for the Display of Asynchronous Irregular Frame Rate Video Data" which issued April 4, 1995, on an application filed by Ronald J. Bowater, Barry K. Aldred and Stephen P. Woodman ("the Bowater, et al. patent"); and

ii. United States Patent no. 5,838,678 entitled "Method and Device for Preprocessing Streams of Encoded Data to Facilitate Decoding Streams Back-to Back" which issued on an application filed July 24, 1996, by Joseph W. Davis and Shawn M. Hayes ("the Davis, et al. patent");

Appellant presented in a Response received by the United States Patent and Trademark Office ("USPTO") on October 9, 2001, an amendment of independent claim 1.

A subsequent Advisory Action, Paper No. 9 mailed October 19, 2001, states that the amendment presented after final rejection would be entered upon filing of a Notice of Appeal and an Appeal Brief with required fees. Exhibits A and B to this Second Appeal Brief establish that:

1. a first Notice of Appeal accompanied the response received by the USPTO on October 9, 2001; and

2. a first Appeal Brief was received by the USPTO on December 7, 2001.

Because Appellant timely filed both:

1. a first Notice of Appeal to the rejection of claims 1-7 set forth in the June 8, 2001, Examiner's Action; and
2. a first Appeal Brief;

Appellant believes that, in accordance with the Advisory Action, Paper No. 9, mailed October 19, 18 2001, the amendment of independent claim 1 in the Response received by the USPTO on October 9, 2001, was entered.

Since the Response received by the USPTO on October 9, 2001, independent claim 1 has not been amended throughout responses that Appellant has filed to an intervening:

1. February 2, 12 2002, Examiner's Action, the pertinent portion of which is attached hereto as Exhibit C, that withdrew the final rejection of claims 1-7 set forth in the Examiner's Action, Paper No. 5 mailed June 8, 2001;
2. October 11, 2002, Examiner's Action, the pertinent portion of which is attached hereto as Exhibit D; and
3. March 18, 2003, Examiner's Action, the pertinent portion of which is attached hereto as Exhibit E, which, similar to the June 8, 2001, Examiner's Action, Paper No. 5, again finally rejected claims 1-3 and 5-7 under 35 U.S.C. § 103(a) only this time:

a. based upon the Bowater, et al. patent; in view of the Davis, et al. patent, i.e. only upon the secondary references appearing in the June 8, 2001 final rejection of claims;

b. rather than as in the June 8, 2001, Examiner's Action, Paper No. 5, upon a combination of the Gormish, et al. patent with:

i. the Bowater, et al. patent; and

ii. the Davis, et al. patent.

Dependent claims 2, 3 and 5 were last amended in a response to a first Examiner's Action dated December 6, 2000, Paper No. 2, that was received by the USPTO on April 18, 2001. The response that was received on April 18, 2001, also presented for the first time new dependent claims 6 and 7.

Dependent claim 4 was last amended in a response to the February 2, 2002, Examiner's Action that was received by the USPTO on July 19, 2002.

Summary of the Invention

As recited in twice amended independent method claim 1, the present invention encompasses:

> [a] method for producing a compressed video bitstream that includes compressed video data for a plurality of frames from data that specifies a single still image
>
> * * *
>
> whereby decoding of the compressed video bitstream produces frames of video which produce images that do not appear to pulse visually.

The invention solves a problem that appears in images produced by a conventional MPEG decoder when decoding a conventionally MPEG encoded video bitstream that reproduce a still image, particularly a still image containing text.

A conventionally encoded MPEG video bitstream includes a sequence of groups of pictures ("GOPs") one of which is identified in FIG. 2 by reference number 52. Each GOP begins with an intra ("I") frame that usually precedes at least one predicted ("P") frame and several bidirectional ("B") frames . Detail in decoded MPEG still images tends to be lower at the beginning of each GOP when an I frame is decoded, increases during decoding of successive P frames and B frames in the GOP, only to decrease again upon decoding the next I frame.

Thus, decoding the conventionally encoded MPEG compressed video bitstream of a still image frequently produces a video image that appears to pulse visually, usually at a frequency identical to the frequency at which GOPs occur in the compressed video bitstream, e.g. twice per second. In many instances, visual pulsing of the still image produced by decompressing a MPEG compressed video bitstream is commercially unacceptable.

As recited in independent claim 1, the method which solves the problem of visual pulsing of images produced from a video bitstream that is conventionally MPEG encoded from a still image that the present patent application claims:

1. fetches data for the still image;

2. encodes the data for the single still image into data for an I frame;

3. stores the encoded I frame data; and

4. assembles the compressed video bitstream by appropriately combining data for:

   a. at least a single copy of the stored I frame;

   b. at least one null frame; and

   c. various headers required for decodability of the compressed video bitstream.

The Issues

1. Whether claims 1-3 and 5-7 are unpatentably obvious under 35 U.S.C. § 103(a) over:

   a. the Bowater, et al. patent; in view of

   b. the Davis, et al. patent.

2. Whether claim 4 is unpatentably obvious under 35 U.S.C. § 103(a) over:

   a. the Bowater, et al. and Davis, et al. patents as applied to claims 1-3 and 5-7; in view of

   b. United States Patent no. 6,310,919 entitled "Method and Apparatus for Adaptively Scaling Motion Vector Information in an Information Stream Decoder" which issued October 30, 2001, on an application filed September 25, 1998, by Dinei Afonso Ferreira Florencio ("the Florencio patent").

3. Whether claims 2 and 3 are unpatentably indefinite under 35 U.S.C. § 112, second paragraph for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim Group

Claims 1-3's and 5-7's rejections under 35 U.S.C. § 103(a) stand or fall by themselves.

Claim 4's rejection under 35 U.S.C. § 103(a) stands or falls by itself.

Claims 2's and 3's rejections under 35 U.S.C. § 112, second paragraph, stand or fall by themselves.

Argument

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Introductory Remarks

Appellant's need to file a second appeal brief in this patent application inherently raises the following question.

> Why would a final rejection of claims be withdrawn after an applicant (appellant) files an appeal brief only to finally reject precisely the same claims for a second time thirteen (13) months and three (3) Examiner Actions later based upon only two (2) subsidiary references appearing in the earlier final rejection of claims?

Applicant respectfully submits that the answer to the preceding question is that:

1. the basis for the original final rejection of claims based upon a combination of three (3) references lacked merit, and
2. for the reasons set forth in detail below, the second final rejection of claims based upon a combination of only two (2) of the three (3) references in the original final rejection of claims also lacks merit.

The Cited References

The Bowater, et al. Patent

The Bowater, et al. patent addresses the technological problem that:

> [i]n computer-based video communication systems, a video signal is obtained from the camera at a constant frame rate but, **after transmission across the asynchronous or non-ideal network, the frames arrive at irregular inter-**

> **vals. Some frames arrive early, some are delayed, and bunching can occur.** The display device at the receiving terminal, however, generally requires a constant frame rate supplied to it (e.g., to match the raster scan rate of a CRT). In such systems it is therefore necessary to match the irregular arrival of frames over the network with the constant supply required to the output screen.
>
> * * *
>
> The designer of computer based video communication systems is . . . faced with the problem of how to achieve regular play-out of the asynchronous incoming video signal while, at the same time, minimising the number of buffered video frames. (Col. 1, lines 38-64) (Emphasis supplied.)

Exhibit F to this Appeal Brief presents those FIGs. and texts in the Bowater, et al. patent that are pertinent to the invention encompassed by the pending claims. Referring now to FIG. 1 in Exhibit F, one can analogize the asynchronous communication channel 15 in the Bowater, et al. patent, which extends horizontally across FIG. 1 between a first source computer 4 and a workstation 13 of destination computer 6, to a multi-lane freeway. In such an analogy, the first source computer 4 and the workstation 13 of destination computer 6 respectively represent an on-ramp to the multi-lane freeway, i.e. the asynchronous communication channel 15, and an off-ramp from the multi-lane freeway. While the first source computer 4 dispatches frames of motion video to the asynchronous communication channel 15 one after the other, analogous to cars entering a multi-lane freeway on a single lane on-ramp, similar to cars on a multi-lane freeway the frames of motion video do not necessarily exit the asynchronous communication channel 15 at the off-ramp workstation 13 of destination computer 6 in the same temporal relationship in which they were dispatched

from the first source computer 4. That is, similar to a car traveling on a multi-lane freeway a frame of motion video dispatched from the first source computer 4 can be delayed due to congestion on the asynchronous communication channel 15, and therefore arrive late at the workstation 13 of destination computer 6. As disclosed in the Bowater, et al. patent, when frames of motion video, i.e. cars, arrive excessively late at the workstation 13 of destination computer 6 the image appearing on the computer monitor 9 of destination computer 6 freezes so badly as to be unwatchable[1].

The invention disclosed in the Bowater, et al. patent necessarily addresses a problem associated with displaying "motion" video rather than displaying video of still images. The Bowater, et al. patent expressly discloses that:

> [v]ideo images are captured at the source computer [4] at a frame rate of 15 frames per second (in this particular embodiment), which is sufficient to provide moderate quality video. (Column 3, lines 46-49)

Near the end of the very same paragraph which contains the preceding excerpt, the Bowater, et al. patent discloses that for a system which lacks the reference's invention:

> [i]t should be noted that the variation in arrival times [of successive frames transmitted across the asynchronous communication channel 15] is such that, even if the hardware could display each frame directly on arrival, **the resulting sequence would be so temporally distorted as to be unwatchable**. (Column 3, lines 59-63) (Emphasis supplied.)

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[1] The Bowater, et al. patent col. 4, lines 1-3, and col. 3, lines 59-63.

Furthermore, even for a system which includes the invention disclosed in the Bowater, et al. patent, that reference in col. 4 at lines 18-28 expressly describes the image presented on the computer monitor 9 of destination computer 6 as "freezing" when "null frames are loaded into the AVK." If the Bowater, et al. patent were describing a still image displayed on the computer monitor 9 of destination computer 6 it would not in col. 4 at lines 18-28 describe the image as "freezing" when "null frames are loaded into the AVK."[2]

Accordingly, the FIGs. and texts in Exhibit F hereto establish that the Bowater, et al. patent, discloses:

1. an apparatus and procedure for buffering **motion** video data in a decoding device prior to displaying an image on a screen that accommodates irregular arrival of frames of video data due to their transmission across an asynchronous or non-ideal network;[3] and
2. accommodating insufficient data arriving at the decoding device via the asynchronous or non-ideal network by:
   a. temporarily freezing the image appearing on the screen by adding null frames;[4] and

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[2] See also paragraphs 7-9 in the Declaration of Mark Conover which accompanied the Response received by the USPTO on January 13, 2003.

[3] The Bowater, et al. patent col. 1, lines 38-49.

[4] The Bowater, et al. patent col. 3, line 65 - col. 6, line 28.

b. subsequently throwing away real data when data of the delayed frames of data does arrive.[5]

Despite diligently searching the Bowater, et al. patent, Applicant is unable to find there any disclosure or even a suggestion that the disclosed buffering technique might be used with anything other than motion video. That is, Applicant is unable to find andy disclosure or suggestion in the Bowater, et al. patent that it might be useful in connection with still images, particularly for preventing still images from pulsing visually.

The Davis, et al. Patent

FIGs. 2, 3A, 3B, 5 and 6 of the Davis, et al. patent respectively illustrate:

1. FIG. 2, the syntax of an MPEG II PES packet;
2. FIGS. 3a and 3b, the organization of an MPEG II video sequence;
3. FIG. 5, the structure of a picture header of the MPEG II video sequence of FIGS. 3a and 3b; and
4. FIG. 6, the structure of a group of pictures header of the MPEG II video sequence of FIGS. 3a and 3b.

The Davis, et al. patent provides the illustrations listed above as background art necessary for a proper understanding of the invention which that reference's discloses.

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[5] The Bowater, et al. patent col. 4, lines 29-41.

Exhibit G to this Appeal Brief presents those FIGs. and texts in the Davis, et al. patent that are pertinent to the invention encompassed by the pending claims. The FIGs. and texts in Exhibit G hereto establish that the problem solved by the Davis, et al. patent is eliminating a one (1) second delay that occurs if both the video decoder and the audio decoder must be reset before beginning to decode a subsequent program.[6]

To solve the preceding technological problem the Davis, et al. patent discloses a method which:

1. first verifies that the multiplexed stream complies with an encoding standard;[7]
2. preprocesses packets of the packetized and encoded:
    a. video sequence such that no video artifacts are produced when the video decoder decodes the immediately following encoded video sequence;[8] and
    b. audio data sequence such that its:
        i. start time is within a first predetermined time of the start time of the video sequence;[9] and

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[6] The Davis, et al. patent col. 5, lines 3-6.

[7] The Davis, et al. patent col. 6, lines 3-5.

[8] The Davis, et al. patent col. 6, lines 5-8.

[9] The Davis, et al. patent col. 6, lines 8-11.

ii. temporal length is within a second predetermined time of the temporal length of the video sequence.[10]

The step of preprocessing the packets of the packetized, encoded, video sequence preferably includes deleting any video frames:

1. that cannot be decoded if video frames of the video sequence are not temporally correct;[11] and
2. following a code indicating an end of the encoded video sequence.[12]

The step of preprocessing the packets of the packetized, encoded, audio sequence preferably includes:

1. removing any partial audio frames;[13]
2. adjusting the number of audio frames, if necessary:
   i. so the audio and video sequences start within the first predetermined time;[14] and
   ii. such that the temporal lengths of the audio and video sequences are within the second predetermined time.[15]

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[10] The Davis, et al. patent col. 6, lines 11-13.

[11] The Davis, et al. patent col. 6, lines 15-17.

[12] The Davis, et al. patent col. 6, lines 17-19.

[13] The Davis, et al. patent col. 6, lines 19-21.

[14] The Davis, et al. patent col. 6, lines 21-24.

[15] The Davis, et al. patent col. 6, lines 24-27.

Despite diligently searching of the Davis, et al. patent, Appellant is unable to find:

1. any mention there that the disclosed preprocessing method may be used advantageously in encoding still images in accordance with the MPEG I or MPEG II standards, or
2. using null frames in any compressed video encoding.

Furthermore, despite diligently searching the Davis, et al. patent Appellant is also unable to find any disclosure or suggestion that the disclosed preprocessing technique prevents still images from pulsing visually.

Thus, at best, the Davis, et al. patent discloses:

1. in FIGs. 2, 3A, 3B, 5 and 6 some information about how compressed video data may be encoded in accordance with the MPEG standard; and
2. that video data compressed in accordance with the MPEG standard can be pre-processed to avoid a one (1) second gap at junctions between different MPEG encoded programs.

The Florencio Patent

The Florencio patent discloses an MPEG-like decoder, depicted in FIG. 1, that receives and decodes a compressed video information stream IN to produce a video output stream OUT. Beginning in column 4 at line 60 and continuing through column 5 at line 12, the Florencio patent describes the decoder as follows.

The MPEG-like decoder 100 comprises an input buffer memory module 111, a variable length decoder (VLD) module 112, an inverse quantizer (IQ) module 113, an inverse discrete cosine transform (IDCT) module 114, a summer 115, a motion compensation module 116, an output buffer module 118, an anchor frame memory module 117, a pixel processor 120 and a motion vector (MV) processor 130.

The input buffer memory module 111 receives the compressed video stream IN, illustratively a variable length encoded bitstream representing, e.g., a high definition television signal (HDTV) or standard definition television signal (SDTV) output from a transport demultiplexer/decoder circuit (not shown). The input buffer memory module 111 is used to temporarily store the received compressed video stream IN until the variable length decoder module 112 is ready to accept the video data for processing. The VLD 112 has an input coupled to a data output of the input buffer memory module 111 to retrieve, e.g., the stored variable length encoded video data as data stream S1.

Legal Principles Applicable to Rejections Under 35 U.S.C. 103(a)

Certain well established principles are to be applied in assessing if an invention is patentable under 35 U.S.C. 103(a). First, the claims of a patent, which define the invention, are "to be construed in light of the specification and both are to be read with a view to ascertaining the invention." United States v. Adams, 383 U.S. 39, 49, 148 USPQ 479, 482 (1966). The "differences between the prior art and the claims at issue are to be ascertained." Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966). Moreover, it is elementary that the claimed invention must be considered as a whole in deciding obviousness. Litton Industrial Products, Inc. v. Solid State Systems Corp., 755 F.2d 158, 164, 225 USPQ 34, 38 (Fed. Cir. 1985). The prior art as a

whole must be considered, and those portions of the prior art arguing against or teaching away from the claimed invention must be considered. Bausch & Lomb, Inc v. Barnes-Hind/Hydrocurve, Inc., 796 F.2d 443, 448, 230 USPQ 416, 420 (Fed. Cir. 1986), In re Hedges, et al., 783 F.2d 1038, 1041, 228 USPQ 685, 687 (Fed. Cir. 1986).

"**[E]lements of separate prior patents cannot be combined when there is no suggestion of such combination anywhere in those patents**". Panduit Corp. v. Dennison Manufacturing Co., 810 F.2d 1561, 1568, 1 USPQ2d 1593, 1597 (Fed. Cir. 1987) citing ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). (Emphasis supplied.) **An examiner is obliged to explain why combining references is proper indicating why one skilled in the art would make a combination or substitution**. Ex parte Skinner, 2 USPQ2d 1788, 1790 (Bd. Pat. App. & Int. 1986). "**When relying on numerous references . . . , . . . the examiner . . . [must] identify some suggestion to combine references or make the modification**." In re Mayne, 104 F.3d 1339, 1342, 41 USPQ2d 1451, 1454 (Fed. Cir. 1997) citing In re Jones 958 F.2d 347, 351, 21 USPQ2d 1941, 1943-44 (Fed. Cir. 1992). (Emphasis supplied.) "In reviewing the Board's obviousness conclusions, we have been guided by the **well-settled principles** that **the claimed invention must be considered as a whole**, **multiple cited prior art references must suggest the desirability of being combined, and the references must be viewed without the benefit of hindsight afforded**

by the disclosure." In re Paulsen, 30 F.3d 1475, 1482, 31 USPQ2d 1671, 1676 (Fed. Cir. 1994). "**[T]he absence of such a suggestion to combine is dispositive in an obvious determination**." Gambro Lundia AB v. Baxter Healthcare Corp., 110 F.3d 1573, 1578-79, 42 USPQ2d 1378, 1383, 1384 (Fed. Cir. 1997) (Emphasis supplied)

Furthermore, **modifying a reference to such an extent that it no longer works for its intended purpose is an unobvious modification. The reference as so modified can no longer be applied to render a claimed invention obvious**. "Indeed, if the French [fuel filter] apparatus were turned upside down, it would be rendered inoperable for its intended purpose." In re Gordon, supra citing Application of Schulpen 390 F.2d 1009, 1013, 157 USPQ 52, 55 (CCPA 1968). In Application of Schulpen the Court of Custom and Patent Appeals ("CCPA") reversed a Board of Appeals decision that a patent application's claims were obvious under 35 U.S.C. § 103 because an allegedly obvious modification of the reference would render the apparatus inoperable for producing the apparatus' intended product. A rejection of claims under 35 U.S.C. § 103 based upon inserting negative lenses, disclosed in one reference, into a camera accessory housing between a lens and a film plane, disclosed in a basic reference, was improper because it destroyed the basic reference for its intended purpose. Ex parte Westphalen, 159 USPQ 507, 508 (Bd. App. 1967). Similarly, claims to a deeply-drawable composite formed by coating a partially drawn non-woven fleece, allegedly disclosed in one reference, with a deep-drawable plastic

film, disclosed in a second reference, were improperly rejected as being obvious because the combination destroyed the invention disclosed in the first reference. Ex parte Hartman, 186 USPQ 366, 367 (Bd. App. 1974).

The Manual of Patent Examining Procedure ("MPEP") § 2143.01, Eighth Edition, August 2001, at p. 2100-124 - 125, in applying the controlling legal authority cited above expressly instructs examiners that claims are not to be rejected for obviousness under 35 U.S.C. § 103(a) relying upon a combination of references that renders one of the references inoperable for that reference's intended purpose. This text in MPEP expressly states as follows.

> THE PROPOSED MODIFICATION CANNOT RENDER THE PRIOR ART UNSATISFACTORY FOR ITS INTENDED PURPOSE
>
> If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F2d 900, 221 USPQ 1125 (Fed. Cir. 1984) (Claimed device was a blood filter assembly for use during medical procedures wherein both the inlet and outlet for the blood were located at the bottom end of the filter assembly, and wherein a gas vent was present at the top of the filter assembly. The prior art reference taught a liquid strainer for removing dirt and water from gasoline and other light oils wherein the inlet and outlet were at the top of the device, and wherein a pet-cock (stopcock) was located at the bottom of the device for periodically removing the collected dirt and water. The reference further taught that the separation is assisted by gravity. The Board concluded the claims were prima facie obvious, reasoning that it would have been obvious to turn the reference device upside down. The court reversed, finding that if the prior art device was turned upside down it would be inoperable for its intended purpose because the gasoline to be filtered would be trapped at the top, the water and heavier oils sought to

be separated would flow out of the outlet instead of the purified gasoline, and the screen would become clogged.).

Finally, it is impermissible to first ascertain factually what the inventor did and then view the prior art in such a manner as to select from the random facts of that art only those which may be modified and then utilized to reconstruct the invention from such prior art. Panduit Corp. v. Dennison Manufacturing Co., 774 F.2d 1082, 1092, 227 USPQ 337, 343 (Fed. Cir. 1985).

> A critical step in analyzing the patentability of claims pursuant to section 103(a) is casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. See Dembiczak, 175 F.3d at 999, 50 USPQ2d at 1617. Close adherence to this methodology is especially important in cases where the very ease with which the invention can be understood may prompt one "to fall victim to the insidious effect of a hindsight syndrome wherein that which only the invention taught is used against its teacher." Id. (quoting W.L. Gore & Assocs., Inc. v. Garlock, Inc., 721 F.2d 1540, 1553, 220 USPQ 303, 313 (Fed. Cir. 1983)). In Re Werner Kotzab, 217 F.3d 1365, 1369, 55 USPQ2d 1313, 1316 (Fed. Cir. 2000).

In Ecolochem, Inc. v. Southern California Edison Company, 227 F.3d 1361, 1371-72, 56 USPQ2d 1065, 1072-73 (Fed. Cir. 2000), the Court of Appeals for the Federal Circuit declared that:

> [i]n In re Dembiczak, we noted that:
>
> > Measuring a claimed invention against the standard established by section 103 requires the oft-difficult but critical step of casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field.
>
> In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). We "cannot use hindsight reconstruction to pick and choose among isolated disclosures in the

prior art to deprecate the claimed invention." In re Fine, 837 F.2d 1071, 1075, 5 USPQ2d 1780, 1783 (Fed. Cir. 1988).

Our case law makes clear that **the best defense against hindsight-based obviousness analysis is the rigorous application of the requirement for a showing of a teaching or motivation to combine the prior art references**. See Dembiczak, 175 F.3d at 999, 50 USPQ2d at 1617. "**Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability--the essence of hindsight**." Id.

"When a rejection depends on a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references." In re Rouffet, 149 F.3d 1350, 1355, 47 USPQ2d 1453, 1456 (Fed. Cir. 1998) (citing In re Geiger, 815 F.2d 686, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987)).

* * *

"**Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination**." ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). Although the suggestion to combine references may flow from the nature of the problem, see Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc., 75 F.3d 1568, 1573, 37 USPQ2d 1626, 1630 (Fed. Cir. 1996), "**[d]efining the problem in terms of its solution reveals improper hindsight in the selection of the prior art relevant to obviousness**," Monarch Knitting Mach. Corp. v. Sulzer Morat Gmbh, 139 F.3d 877, 880, 45 USPQ2d 1977, 1981 (Fed. Cir. 1998). Therefore, "[w]hen determining the patentability of a claimed invention which combines two known elements, '**the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination**.'" In re Beattie, 974 F.2d 1309, 1311-12, 24 USPQ2d 1040, 1042 (Fed. Cir. 1992) (quoting Lindemann, 730 F.2d at 1462, 221 USPQ at 488). (Emphasis supplied.)

Claims 1-3 and 5-7 Are Allowable Over the Bowater, et al. Patent In View of the Davis, et al. Patent

A. Fetching Still Image Data

The preamble of twice amended independent method claim 1 expressly states that the claimed method must produce:

> a compressed video bitstream that includes compressed video data for a plurality of frames from data that specifies a single still image.

In producing the compressed video bitstream, the text of twice amended independent claim 1 expressly requires performing the method step of:

> fetching the data for the still image.

In rejecting claims 1-3 and 5-7 for obviousness under 35 U.S.C. § 103(a), the Examiner's Action dated March 18, 2003, in the 5th and 6th lines of the last paragraph on page 3 alleges that column 3, lines 19-34 and column 4, lines 42-68 in the Bowater, et al. patent disclose "fetching the data for the still image." Set forth below are texts excerpted from the Bowater, et al. patent that the Examiner's Action alleges disclose "fetching the data for the still image."

> FIG. 1 shows a network 2 of computers 4, 6, 8 connected by an asynchronous communication channel 15 (e.g., LAN or ISDN). **A camera 16 at a first computer 4 obtains a video signal, normally of the user, which is compressed and submitted to the network.**[16] The signal is

[16] Note that the "video signal" obtained by the first computer 4 as described in this excerpt from the Bowater, et al. patent is not that of a "still image" as that term is used in pending independent claim 1. For a description of the type of "video signal" being produced by the

then transmitted down the communication channel in packet format before arriving at the destination computer 6. Typically, this second computer includes hardware such as the Intel/IBM ActionMedia II (AMII) card, which is responsible for actually decompressing and displaying the video image on the screen 9. In video conferencing applications, the reverse process also occurs; i.e., the second computer is simultaneously sending an image of its user back to the first computer 4 for display. It is also possible to set up multi-way conferences. (Column 3, lines 19-34) (Emphasis supplied.)

The technique used to discard frames exploits the fact that, due to the limited bandwidth of the channel, the video signal is compressed before transmission over a computer based communication line. Basically, two types of compression, spatial and temporal, are used. In the former, the redundancy within a single frame is removed, for example, by using the fact that adjacent pixels often have closely related brightness and color

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video camera 16 refer to the Bowater, et al. patent in column 3 at lines 46-49 which expressly states:

> **[v]ideo images are captured at the source computer [4] at a frame rate of 15 frames per second (in this particular embodiment), which is sufficient to provide moderate quality video.**

The preceding text excerpted from the Bowater, et al. patent irrefutably establishes that the "video signal" produced by a video camera 16 is not the "data that specifies a single still image" as recited in the preamble of independent claim 1.

values. **A frame encoded using only spatial compression is known as a "still frame"**. Temporal compression achieves a further level of compression by exploiting the fact that the luminosity and color of the same pixel in two consecutive frames are, again, likely to be highly correlated. Therefore, in temporal compression, a frame is encoded as a "relative frame" in terms of its difference from the previous frame (we assume that a relative frame is also spatially compressed). The greatest reduction in data is achieved if every frame (apart from the first) is a relative frame, but this is highly error prone since the loss of a single frame will produce defects that persist for all subsequent frames. Therefore, as a compromise, **every Nth frame can be sent as a still frame**, with all intervening frames as relative frames, so that **the result of compression is a regularly spaced series of frames whose size varies somewhat according to the temporal and spatial content of the data and, of course, whether that particular frame is a still or relative frame**. In the present embodiment, N=6 (i.e., there are 5 relative frames for each still frame), although, sometimes, if there is a lot of movement so that successive frames are dissimilar, then the frequency of still frames is increased (i.e., N=6 is effectively an upper limit).[17] (Column 4, lines 42-68) (Emphasis supplied.)

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[17] Note that the phrase "still frame" as used in this excerpt from the Bowater, et al. patent identifies something which differs markedly from that identified by the phrase "still image" in pending independent claim 1.

The phrase "still frame" as used in this excerpt from the Bowater, et al. patent identifies a specific, particular type of frame of compressed data in a video bitstream, i.e. an I frame in the terminology of the pending patent application. In the present application an I frame:

1. is depicted three times in FIG. 2 by a box labeled with the reference number 54;
2. is one of three different types of frame data included in a Group of Pictures ("GOP") depicted in FIG. 2 that bears the reference number 52; and
3. which is therefore necessarily included within each the several boxes labeled with the reference number 52 that appear at the **far right hand side of FIG. 4**.

Conversely, the phrase "still image" as used in pending independent claim 1 refers to uncompressed video data indicated in the pending application by a box labeled

The preamble to independent claim 1 establishes that all the steps recited for the claimed method produce a "compressed video bitstream . . . from data that specifies a single still image." Appellant is unable to find anywhere in the excerpts quoted above from the Bowater, et al. patent "fetching the data for the still image" for the purpose of producing a "compressed video bitstream" as those phrases are used in pending independent claim 1.

The text excerpt above which the Examiner's Action dated March 18, 2003, allegedly discloses "fetching the data for the still image" includes seven-hundred and fifty-one (751) words. Nowhere in those seven-hundred and fifty-one (751) words does the phrase "still image," or an equivalent thereto, occur. For this and all the preceding reasons, Appellant respectfully submits that the Examiner's Action dated March 18, 2003, fails to identify specific word(s), phrase(s) or sentence(s) citing column(s) and line number(s) in the Bowater, et al. patent which disclose or even suggest "fetching the data for the still image."

B. Encoding Still Image Data

In producing the compressed video bitstream, the text of twice amended independent claim 1 expressly requires performing the method step of:

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with the reference number 104 that:
1. appears at the **far left hand side of FIG.** 4; and
2. is described by text appearing on page 14 at lines 4-7.

encoding the data for the single still image into data for an I frame.

In rejecting claims 1-3 and 5-7 for obviousness under 35 U.S.C. § 103(a), the Examiner's Action dated March 18, 2003, in the 6th and 7th lines of the last paragraph on page 3 alleges that column 4, lines 42-68 in the Bowater, et al. patent disclose "encoding the data for the single still image into data for an I frame." Set forth below is the text excerpted from the Bowater, et al. patent that the Examiner's Action alleges discloses "encoding the data for the single still image into data for an I frame."

> The technique used to discard frames exploits the fact that, due to the limited bandwidth of the channel, the video signal is compressed before transmission over a computer based communication line. Basically, two types of compression, spatial and temporal, are used. In the former, the redundancy within a single frame is removed, for example, by using the fact that adjacent pixels often have closely related brightness and color values. **A frame encoded using only spatial compression is known as a "still frame".** Temporal compression achieves a further level of compression by exploiting the fact that the luminosity and color of the same pixel in two consecutive frames are, again, likely to be highly correlated. Therefore, in temporal compression, a frame is encoded as a "relative frame" in terms of its difference from the previous frame (we assume that a relative frame is also spatially compressed). The greatest reduction in data is achieved if every frame (apart from the first) is a relative frame, but this is highly error prone since the loss of a single frame will produce defects that persist for all subsequent frames. Therefore, as a compromise, **every Nth frame can be sent as a still frame**, with all intervening frames as relative frames, so that the result of compression is a regularly spaced series of frames whose size varies somewhat according to the temporal and spatial content of the data and, of course, whether that particular frame is a still or relative frame. In the present embodiment, N=6 (i.e., there are 5 relative frames for each still frame), although, sometimes, if there is a lot of movement so that successive frames are dissimilar, then the frequency

of still frames is increased (i.e., N=6 is effectively an upper limit). (Column 4, lines 42-68) (Emphasis supplied.)

Appellant agrees that the excerpt set forth above from the Bowater, et al. patent discloses, in the terminology of the pending patent application, encoding an I frame. However, Appellant is unable to find anything in the excerpt set forth above from the Bowater, et al. patent which discloses or suggests that data for a still image, as that terminology is used in the pending patent application, is being encoded into an I frame.

The text excerpt above which the Examiner's Action dated March 18, 2003, allegedly discloses "encoding the data for the single still image into data for an I frame" includes two-hundred and ninety-two (292) words. Nowhere in those two-hundred and ninety-two (292) words does the phrase "still image," or an equivalent thereto, occur. For this and all the preceding reasons, Appellant respectfully submits that the Examiner's Action dated March 18, 2003, fails to identify specific word(s), phrase(s) or sentence(s) citing column(s) and line number(s) in the Bowater, et al. patent which disclose or even suggest "encoding the data for **the single still image** into data for an I frame."

C. **Storing the Encoded I Frame**

In producing the compressed video bitstream, the text of twice amended independent claim 1 expressly requires performing the method step of:

storing the encoded I frame data.

In rejecting claims 1-3 and 5-7 for obviousness under 35 U.S.C. § 103(a), the Examiner's Action dated March 18, 2003, in the 7th and 8th lines of the last paragraph on page 3 alleges that the box identified by the reference number 4 in FIG. 1 of the Bowater, et al. patent disclose "storing the encoded I frame data." Since the box identified by reference number 4 in FIG. 1 of the Bowater, et al. patent omits descriptive text required by 35 U.S.C. §§ 1.83(a) and 1.83(c), **Appellant is baffled how, without the assistance provided by the text of pending independent claim 1, an unlabeled box in drawing FIG. 1 of the Bowater, et al. patent that is identified by only the word "computer" in that reference's text can disclose "storing the encoded I frame data."**

Set forth below are **all texts** which Appellant can identify in the Bowater, et al. patent which pertain to the box identified by the reference number 4 in FIG. 1.

> FIG. 1 shows a network 2 of computers 4, 6, 8 connected by an asynchronous communication channel 15 (e.g., LAN or ISDN). A camera 16 at a first computer 4 obtains a video signal, normally of the user, which is compressed and submitted to the network. (Column 3, lines 19-26)
>
> In video conferencing applications, the reverse process also occurs; i.e., the second computer is simultaneously sending an image of its user back to the first computer 4 for display. (Column 3, lines 29-34)
>
> Video images are captured at the source computer [4] at a frame rate of 15 frames per second (in this particular embodiment), which is sufficient to provide moderate quality video. (Column 3, lines 46-49)

> Changes in CPU activity at the source [computer 4] and destination computer [6] can also lead to variations in the effective frame arrival rate. (Column 3, lines 54-56)
>
> The system and method described can also be used to compensate, for example, for lost frames, or if there is a slight discrepancy between the clock rates of the source [computer 4] and destination computer [6]. (Column 7, lines 24-27)

Appellant is unable to find in any of the preceding excerpts from the Bowater, et al. patent a disclosure of "storing the encoded I frame data."

If it is to be alleged that the box identified by the reference number 4 in FIG. 1 of the Bowater, et al. patent discloses or suggests "storing the encoded I frame data," Appellant demands an explanation of how, **without the assistance provided by the text of pending independent claim 1**, the unlabeled box in FIG. 1 identified by the reference number 4 discloses or suggests "storing the encoded I frame data."

D. Assembling a Compressed Video Bitstream

In producing the compressed video bitstream, the text of twice amended independent claim 1 expressly requires performing a method step which includes:

> assembling the compressed video bitstream by appropriately combining data for:
> at least a single copy of the stored I frame;
> at least one null frame.

In rejecting claims 1-3 and 5-7 for obviousness under 35 U.S.C. § 103(a), the Examiner's Action dated March 18, 2003, in the

8th through 11th lines of the last paragraph on page 3 alleges that the box identified by reference number 4 in FIG. 1, column 3, lines 19-34, column 4, lines 42-68, column 2, lines 48-62, column 6 line 59 to column 7[18] in the Bowater, et al. patent disclose:

> assembling the compressed video bitstream by appropriately combining data for:
> at least a single copy of the stored I frame;
> at least one null frame.

Set forth below are texts excerpted from the Bowater, et al. patent that the Examiner's Action alleges discloses:

> assembling the compressed video bitstream by appropriately combining data for:
> at least a single copy of the stored I frame;
> at least one null frame.
>
> FIG. 1 shows a network 2 of computers 4, 6, 8 connected by an asynchronous communication channel 15 (e.g., LAN or ISDN). A camera 16 at a first computer 4 obtains a video signal, normally of the user, which is compressed and submitted to the network. The signal is then transmitted down the communication channel in packet format before arriving at the destination computer 6. Typically, this second computer includes hardware such as the Intel/IBM ActionMedia II (AMII) card, which is responsible for actually decompressing and displaying the video image on the screen 9. In video conferencing applications, the reverse process also occurs; i.e., the second computer is simultaneously sending an image of its user back to the first computer 4 for display. It is also possible to set up multi-way conferences. (Column 3, lines 19-34)
>
> The technique used to discard frames exploits the fact that, due to the limited bandwidth of the channel, the video signal is compressed before transmission over a computer based communication line. Basically, two

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[18] The final paragraph on page 3 of the Examiner's Action in line 11 lacks a line number for the citation to column 7. Appellants therefor include in the excerpt from the Bowater, et al. patent all the text in column 7 preceding the claims.

types of compression, spatial and temporal, are used. In the former, the redundancy within a single frame is removed, for example, by using the fact that adjacent pixels often have closely related brightness and color values. A frame encoded using only spatial compression is known as a "still frame". Temporal compression achieves a further level of compression by exploiting the fact that the luminosity and color of the same pixel in two consecutive frames are, again, likely to be highly correlated. Therefore, in temporal compression, a frame is encoded as a "relative frame" in terms of its difference from the previous frame (we assume that a relative frame is also spatially compressed). The greatest reduction in data is achieved if every frame (apart from the first) is a relative frame, but this is highly error prone since the loss of a single frame will produce defects that persist for all subsequent frames. Therefore, as a compromise, every Nth frame can be sent as a still frame, with all intervening frames as relative frames, so that the result of compression is a regularly spaced series of frames whose size varies somewhat according to the temporal and spatial content of the data and, of course, whether that particular frame is a still or relative frame. In the present embodiment, N=6 (i.e., there are 5 relative frames for each still frame), although, sometimes, if there is a lot of movement so that successive frames are dissimilar, then the frequency of still frames is increased (i.e., N=6 is effectively an upper limit). (Column 4, lines 42-68)

It is also advantageous, on occasions **when the first buffer is empty and the second buffer needs more frames, for the control process to create null frames for transfer to the second buffer**. This, again, reduces the risk of buffer starvation of the second buffer. Since any nulls so inserted add to the effective buffering, it is also useful to be able to delete delayed frames when they do finally arrive, so as to allow the displayed image to catch up with the received one. In a system in which the video is compressed as a sequence of still and relative frames, this is preferably achieved when the first buffer is full by: (i) if the incoming frame is a still frame, flushing the contents of the first buffer, or (ii) if the incoming frame is a relative frame, flushing the contents of the first buffer up to the first still frame. (Column 2, lines 48-62) (Emphasis supplied.)

The control process is responsible first for receiving data into the circular buffer, and then for

forwarding it to the AVK. There is no control over output from the AVK, which is at a fixed rate. As explained in more detail below, the AVK requests frames from the circular buffer as required. Clearly, if frames are present in the circular buffer, then these can be forwarded to the AVK. However, in video conferencing or other interactive applications where the overall amount of buffering is limited, **there may occasionally be particularly long delays on the network during which time the circular buffer empties. In this case, the control process reacts by loading the AVK with null frames. A null frame is essentially the same as the preceding frame, so that, as far as the viewer is concerned, video image temporarily freezes.** Thus, each time the control process fails to find frames in the circular buffer, the requisite number of null frames are loaded into the AVK instead.

Although the user may not notice the insertion of individual null frames, each null frame adds to the overall delay in the system (i.e., it is effectively another form of buffering). If more and more null frames are inserted into the video stream, then this will, again, lead to an intrusive delay between transmission and display. This problem can be overcome by the circular buffer throwing away real data when the delayed frames do finally arrive. These frames are then effectively lost, allowing the displayed image to catch up with the incoming signal. It is the presence of two buffers that gives the flexibility to lose frames in this way, and so cope with occasional delays longer than T(L). (Column 4, lines 11-41) (Emphasis supplied.)

Once the control process has determined the number of frames to transfer to the AVK, it can either send this as a single request, or as an appropriate number of requests for individual frames. In the latter case, the circular buffer can respond simply to each request by transferring a frame if available, or inserting a null frame if not.

The particular embodiment described above is determined to some extent by the hardware used and, in particular, to allow operation with the AMII card. This card was designed originally for multimedia applications, where the AVK could be filled with many frames from disk, without regard to the lag between reading and display. Thus, up to 100 frames representing several seconds of video could, typically, be preloaded into the AVK buffer. This is partly why the AVK does not cope well with buffer starvation and requires a long time to reset, since it was never intended to operate at such low buffering

> levels. By contrast, the circular buffer is relatively unaffected by emptying. This is why the control process is happy to exhaust the frames in the circular buffer to keep the AVK supplied, and even to insert null frames if necessary. It should be noted that, if the relative consequences of buffer starvation were altered, this strategy would have to be adjusted appropriately.
>
> The control process can be implemented as a standard task or thread on the workstation, whilst the circular buffer is maintained in general storage. However, it may also be possible to implement some of the function in hardware if required. Likewise, the hardware/software mix of the AMII card or equivalent may also be changed. The system and method described can also be used to compensate, for example, for lost frames, or if there is a slight discrepancy between the clock rates of the source and destination computers. (Column 6, line 59 through column 7)

As set forth above in section B, Appellant agrees that the excerpts set forth above from the Bowater, et al. patent disclose encoding an I frame. However, Appellant is unable to find anything in the excerpts set forth above from the Bowater, et al. patent which discloses or even suggests "assembling the compressed video bitstream by appropriately combining data for . . . at least **a single copy of the stored I frame**."

Appellant further agrees that the excerpts set forth above from the Bowater, et al. patent disclose creating at the workstation 13 of the destination computer 6 null frames for transfer to the second interface buffer 25 of the Intel/IBM ActionMedia II ("AMII") card 125 located in the workstation 13 of the destination computer 6 when the first buffer 23 is empty and the second interface buffer 25 needs more frames. Similarly Appellant further agrees that the excerpts set forth above from the Bowater, et al. patent discloses that:

> there may occasionally be particularly long delays on the network during which time the circular buffer [in the destination computer 6] empties. In this case, the control process [running in the destination computer 6] reacts by loading the AVK [in the destination computer 6] with null frames. A null frame is essentially the same as the preceding frame, so that, as far as the viewer is concerned, video image temporarily freezes.

However, Appellant is unable to find anything in the excerpts set forth above from the Bowater, et al. patent which discloses or suggests "assembling the compressed video bitstream by appropriately combining data for . . . at least **a single copy of [an] I frame** and **at least one null frame**."

The text excerpt above which the Examiner's Action dated March 18, 2003, allegedly discloses "assembling the compressed video bitstream by appropriately combining data for . . . at least a single copy of [an] I frame and at least one null frame" includes one-thousand one-hundred seventy-nine (1,179) words. Nowhere in those one-thousand one-hundred seventy-nine (1,179) words does the phrase "single copy of [an] I frame," or an equivalent thereto, occur. For this and all the preceding reasons, Appellant respectfully submits that the Examiner's Action dated March 18, 2003, fails to identify specific word(s), phrase(s) or sentence(s) citing column(s) and line number(s) in the Bowater, et al. patent which disclose or even suggest "assembling the compressed video bitstream by appropriately combining data for . . . at least a single copy of [an] I frame and at least one null frame."

E. Claim 1's Whereby Clause

Independent claim 1, after reciting the four (4) method steps set forth above in Sections A. through D., concludes with a whereby clause which recites that these four method steps produce a compressed video bitstream which upon:

> decoding of the compressed video bitstream produces frames of video which produce images that do not appear to pulse visually.

In rejecting claims 1-3 and 5-7 for obviousness under 35 U.S.C. § 103(a), the Examiner's Action dated March 18, 2003, in lines 11 through 13 of the last paragraph on page 3 and in lines 1 and 2 at the top of page 4 alleges that column 3, line 19 through column 4, line 41 in the Bowater, et al. patent disclose "decoding of the compressed video bitstream produces frames of video which produce images that do not appear to pulse visually." Set forth below is the text excerpted from the Bowater, et al. patent that the Examiner's Action alleges discloses "decoding of the compressed video bitstream produces frames of video which produce images that do not appear to pulse visually."

> FIG. 1 shows a network 2 of computers 4, 6, 8 connected by an asynchronous communication channel 15 (e.g., LAN or ISDN). A camera 16 at a first computer 4 obtains a video signal, normally of the user, which is compressed and submitted to the network. The signal is then transmitted down the communication channel in packet format before arriving at the destination computer 6. Typically, this second computer includes hardware such as the Intel/IBM ActionMedia II (AMII) card, which is responsible for actually decompressing and displaying the video image on the screen 9. In video conferencing applications, the reverse process also occurs; i.e., the second computer is simultaneously sending an image of its

user back to the first computer 4 for display. It is also possible to set up multi-way conferences.

With reference now to FIG. 2, the incoming video signal from the communication subsystem 15 arrives at the workstation 13 for display on the associated monitor 9. The signal is transferred first to a buffer 23, and then to the AMII card 125 or, more particularly, to the AudioVisual Kernel (AVK) interface buffer 25 of the AMII card. The buffer 23 provides a FIFO queue, conveniently implemented as a circular buffer. A control process 27 is responsible first for reading incoming data into the circular buffer, and then for transferring data from the circular buffer to the AVK.

Video images are captured at the source computer at a frame rate of 15 frames per second (in this particular embodiment), which is sufficient to provide moderate quality video. This is also the rate at which they are read out of the AVK to the screen. However, the transmission rate over the network is variable, depending on network load, etc., so that the arrival rate at the end of the computer subsystem departs from this 15 Hz clock. Changes in CPU activity at the source and destination computers can also lead to variations in the effective frame arrival rate. Individual frames can have either a positive or negative offset from their nominal arrival time, although it is assumed that frames do, in fact, arrive in the correct sequence. **It should be noted that the variation in arrival times is such that, even if the hardware could display each frame directly on arrival, the resulting sequence would be so temporally distorted as to be unwatchable.** Thus, some form of buffering is essential.

Together, the AVK and circular buffer compensate for the variable arrival rate of the video frames by introducing a time-lag, T(L), between the received and displayed images. Any frame arriving within T(L) of its nominal arrival time can be properly displayed. Only if a frame arrives more than T(L) late, will the AVK and circular buffer empty and the video image will freeze.[19]

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[19] The text of the Bowater, et al. patent expressly states that the invention disclosed there does not prevent video images from freezing. In column 4 at lines 22-26 the Bowater, et al. patent expressly declares that:

> In this case, the control process reacts by loading the AVK with null frames. A null frame is essentially the same as the preceding frame, so that, **as far as the viewer is con-**

To decrease the risk of buffer starvation, the buffer size can be increased to make T(L) larger, but with a 15 frames per second transmission rate, storing only 10 frames adds a delay of 2/3 second. If the effectiveness of interactive applications such as video conferencing is not to be seriously degraded, only a handful of frames can be buffered with T(L) correspondingly small.

The control process is responsible first for receiving data into the circular buffer, and then for forwarding it to the AVK. There is no control over output from the AVK, which is at a fixed rate. As explained in more detail below, the AVK requests frames from the circular buffer as required. Clearly, if frames are present in the circular buffer, then these can be forwarded to the AVK. However, **in video conferencing or other interactive applications where the overall amount of buffering is limited, there may occasionally be particularly long delays on the network during which time the circular buffer empties. In this case, the control process reacts by loading the AVK with null frames. A null frame is essentially the same as the preceding frame, so that, as far as the viewer is concerned, video image temporarily freezes.** Thus, each time the control process fails to find frames in the circular buffer, the requisite number of null frames are loaded into the AVK instead.

Although the user may not notice the insertion of individual null frames, each null frame adds to the overall delay in the system (i.e., it is effectively another form of buffering). **If more and more null frames are inserted into the video stream, then this will, again, lead to an intrusive delay between transmission and display.** This problem can be overcome by the circular buffer throwing away real data when the delayed frames do finally arrive. These frames are then effectively lost, allowing the displayed image to catch up with the incoming signal. It is the presence of two buffers that gives the flexibility to lose frames in this way, and so cope with occasional delays longer than T(L). (Column 3, line 19 through column 4, line 41) (Emphasis supplied.)

Appellant is unable to find anywhere in the excerpt set forth above from the Bowater, et al. patent a disclosure that:

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cerned, video image temporarily freezes.

decoding of the compressed video bitstream produces frames of video which produce images that **do not appear to pulse visually**.

Rather, Appellant finds in the text identified in the Examiner's action only express admissions that:

1. lacking the invention disclosed in the Bowater, et al. patent "the resulting sequence [of video images] would be so temporally distorted as to be unwatchable;" and
2. using the invention disclosed in the Bowater, et al. patent "as far as the viewer is concerned, **video image temporarily freezes**."

The text excerpt above which the Examiner's Action dated March 18, 2003, allegedly discloses the whereby clause of "decoding of the compressed video bitstream produces frames of video which produce images that do not appear to pulse visually" includes eight-hundred and seventy-three (873) words. Nowhere in those eight-hundred and seventy-three (873) words does the phrase "pulse visually," or an equivalent thereto, occur. For this and all the preceding reasons, Appellant respectfully submits that the Examiner's Action dated March 18, 2003, fails to identify specific word(s), phrase(s) or sentence(s) citing column(s) and line number(s) in the Bowater, et al. patent which disclose or even suggest the whereby clause of "decoding of the compressed video bitstream produces frames of video which produce images that do not appear to pulse visually."

F. **Disclosure Missing from the Bowater, et al. Patent**

In rejecting twice amended independent claim 1, **expressly contradicting the allegations quoted above in Section C from the Examiner's Action dated March 18, 2003**, in a text quoted below from page 4, lines 4-6 the Examiner's Action dated March 18, 2003, **admits that the Bowater, et al. patent fails to disclose**:

> encoding the data for the single still image into data for an intra frame, storing the encoded I frame data, and wherein the assembling the compressed video bitstream combines at least a single copy of the stored I frame as claimed **in claim 1**.

Appellant first notes that the preceding admission is incomplete. That is, the admission fails to mention the null frame expressly required by the text of this method step in independent claim 1.

> assembling the compressed video bitstream by appropriately combining data for:
> at least a single copy of the stored I frame;
> **at least one null frame**; and
> various headers required for decodability of the compressed video bitstream.

In an attempt to plug the preceding admitted hole in the disclosures of the Bowater, et al. patent, the Examiner's Action on page 5 in lines 2-4 then identifies in text quoted below FIGs. 2, 3A, 3B, 5, and 6 apparently together with FIG. 16 in the Davis, et al. patent.

> Davis et al discloses a method and device for preprocessing streams of encoded data to facilitate decoding streams back to back as shown in Figures 2, 3A, 3B, 5, and 6, and teaches the conventional MPEG video compression processings involving I, P, and B frames (see figure 16).

Copies of FIGs. 2, 3A, 3B, 5, 6 and 16 excerpted from the Davis, et al. patent are attached hereto as Exhibit G.

Noting that the Examiner's Action dated March 18, 2003, fails to identify any text in the Davis, et al. patent pertaining to its rejection of independent claim 1, set forth below are descriptions for the cited FIGs. excerpted from the text of the Davis, et al. patent.

> FIG. 2 is a diagram which illustrates the syntax of an MPEG II PES packet.
>
> FIGS. 3a and 3b illustrate the organization of an MPEG II video sequence.
>
> FIG. 4 illustrates the structure of a sequence header of the MPEG II video sequence of FIGS. 3a and 3b.
>
> FIG. 5 illustrates the structure of a picture header of the MPEG II video sequence of FIGS. 3a and 3b.
>
> FIG. 6 illustrates the structure of a group of pictures header of the MPEG II video sequence of FIGS. 3a and 3b.
>
> * * *
>
> FIG. 16 is a chart which illustrates an example of the ordering of various types of compressed picture frames at various stages of encoding video, transmitting an MPEG stream, and decoding.

Having thus nebulously identified seven (7) FIGs. selected from the Davis, et al. patent, the Examiner's Action, without identifying any specific element in the cited FIGs. or any text in the Davis, et al. patent, then alleges on page 5 in lines 5-13 that:

> [t]herefore, **it would have been obvious to one of ordinary skill in the art**, having the Bowater et al and Davis et al references in front of him/her and the general knowledge of intra frame processings within the MPEG video compression standard, **would have had no difficulty in providing the intra frame processings as taught by Davis et al within the encoder and decoder of Bowater et al thereby providing the encoding of the data** for the single still image into data for an intra frame,

> storing the encoded I frame data, and wherein the assembling the compressed video bitstream combines at least a single copy of the stored I frame if such intra frame processing were not already within the encoding/decoding of Bowater et al **for the same well known purposes as claimed**. (Emphasis supplied.)

Accepting the preceding allegation solely for purposes of analysis, Appellant observes that it fails to justify rejecting pending independent claim 1. The statement fails to justify rejecting independent claim 1 because it does not identify any motivation or suggestion for combining the disclosures of the Bowater, et al. and Davis, et al. patents. The nearest thing which the preceding excerpt from the Examiner's Action contains which could be construed as identifying a motivation or suggestion for combining the disclosures of the two references is the statement that:

> one of ordinary skill in the art, . . . , **would have had no difficulty** in providing the intra frame processings as taught by Davis et al within the encoder and decoder of Bowater et al thereby providing the encoding of the data . . . for the same well known purposes as claimed.

Appellant further observes that there appears to be no justification anywhere in the Examiner's Action for the allegation in the preceding quotation that the claimed invention's "purpose" is "well known." If it is alleged that the purposes of the invention encompassed by pending claim 1 were "well known" when the pending patent application was filed now almost five (5) years ago, Appellant strictly demands proof of such knowledge.

Rather than identifying in the Bowater, et al. and Davis, et. al. a motivation or suggestion that they could be advantageously combined to produce the invention encompassed by pending independent claim 1, Appellant respectfully submits that the text quoted above from the Examiner's Action fails to **explain why combining references is proper indicating why one skilled in the art would make a combination or substitution** as required by Ex parte Skinner, 2 USPQ2d 1788, 1790 (Bd. Pat. App. & Int. 1986).

Appellant respectfully submits that what the excerpt quoted above from the Examiner's action truly says is that if one of ordinary skill in the art already knew about the invention, then they could selectively choose elements from the Bowater, et al. and Davis, et al. patents to reproduce the invention. **It is impermissible to first ascertain factually what the inventor did and then view the prior art in such a manner as to select from the random facts of that art only those which may be modified and then utilized to reconstruct the invention from such prior art**. Panduit supra.

The Appellant respectfully submits that the excerpt quoted above from the Examiner's Action:

1. clearly defines the problem solved by the invention encompassed by pending claim 1 in terms of its solution; and then
2. views the prior art of the Bowater, et al. and Davis, et al. patents in such a manner as to select from their

random facts only those which may be modified and then utilized to reconstruct the invention encompassed by pending claim 1.

Modification of the Bowater, et al, Patent Is Unobvious

A camera 16 at **a first computer 4 obtains a video signal, normally of the user, which is compressed and submitted to the network. The [compressed] signal is then transmitted down the communication channel in packet format before arriving at the destination computer 6.** (Column 3, lines 19-26) (Emphasis supplied.)

With reference now to FIG. 2, **the incoming video signal from the communication subsystem 15 arrives at the workstation 13 [of the destination computer 6] for display on the associated monitor 9. The signal is transferred first to a buffer 23, and then to the AMII card 125 or, more particularly, to the AudioVisual Kernel (AVK) interface buffer 25 of the AMII card.** The buffer 23 provides a FIFO queue, conveniently implemented as a circular buffer. **A control process 27 is responsible first for reading incoming data into the circular buffer, and then for transferring data from the circular buffer to the AVK.** (Column 3, lines 35-45) (Emphasis supplied.)

The control process is responsible first for receiving data into the circular buffer, and then for forwarding it to the AVK. There is no control over output from the AVK, which is at a fixed rate. As explained in more detail below, the AVK requests frames from the circular buffer as required. Clearly, if frames are present in the circular buffer, then these can be forwarded to the AVK. However, **in video conferencing or other interactive applications where the overall amount of buffering is limited, there may occasionally be particularly long delays on the network during which time the circular buffer empties. In this case, the control process reacts by loading the AVK with null frames.** (Column 4, lines 11-28) (Emphasis supplied.)

The excerpts set forth above from the Bowater, et al. patent establish that video data compression occurs in the first computer

4. The excerpts also establish that it is a "control process" operating in the workstation 13 of the destination computer 6 which adds null frames to a buffer that is located in the workstation 13.

Since the invention claimed in the present application is:

> [a] method for producing a compressed video bitstream that includes compressed video data for a plurality of frames from data that specifies a single still image,

in the context of the disclosure of the Bowater, et al. patent compression of images necessarily occurs in the first computer 4. The adaptation of the Bowater, et al. patent's disclosure set forth in the Examiner's Action's rejection of claims for obviousness under 35 U.S.C. § 103(a) necessarily requires combining:

1. the control process, operating in the workstation 13 of the destination computer 6 which inserts null frames into the second interface buffer 25 of the AMII card 125; with
2. the first computer 4 that performs image compression.

The Examiner's Action dated March 18, 2003, **admits** in the following excerpt that **its modification of the disclosure of the Bowater, et al. patent** to reject claims for obviousness under 35 U.S.C. § 103(a) **necessarily requires combining the decoder in the destination computer 6 with the encoder in the first source computer 4**.

> it would have been obvious to one of ordinary skill in the art . . . **in providing the intra frame processings as taught by Davis et al within the encoder and decoder of Bowater et al** . . . . (Examiner's Action page 5 lines 5-9) (Emphasis supplied.)

A copy of FIG. 1 from the Bowater, et al. patent rearranged to illustrate the modification required by all the Examiner's Action's

rejection of claims for obviousness under 35 U.S.C. § 103(a) is attached hereto as Exhibit H.

The modification of the disclosure of the Bowater, et al. patent required by Examiner's Action's rejection of claims for obviousness under 35 U.S.C. § 103(a) illustrated in Exhibit H renders the network 2 of computers 4, 6, 8 disclosed in that reference inoperable for the Bowater, et al. patent's intended purpose. For example, the asynchronous communication channel 15 depicted in Exhibit H's modified FIG. 1 no longer connects the first source computer 4 to the destination computer 6. Because, the asynchronous communication channel 15 no longer connects the first source computer 4 to the destination computer 6, frames of video data no longer arrive irregularly at the destination computer 6 due to their transmission across an asynchronous or non-ideal network, i.e. the asynchronous communication channel 15. Because frames of video data no longer arrive irregularly at the destination computer 6, there no longer exists any need for the invention disclosed in the Bowater, et al. patent which seeks to accommodate frames of video data arriving irregularly at the destination computer 6. Thus, modifying the disclosure of the Bowater, et al. patent as required by the rejection of claims for obviousness under 35 U.S.C. § 103(a) in the Examiner's Action dated March 18, 2003, renders the invention disclosed in that reference no longer useable for its intended purpose.

The controlling legal authority identified above declares that modifying a reference to such an extent that it becomes unusable for its intended purpose is an unobvious modification. For the reasons set forth above, combining the disclosure of the Bowater, et al. patent in the way required by the Examiner's Action dated March 18, 2003, with the disclosure of any other reference(s) to reject claims for obviousness under 35 U.S.C. § 103(a) necessarily requires modifying that reference's disclosure so the reference becomes no longer useful for its intended purpose. Consequently, because all rejection of claims for obviousness under 35 U.S.C. § 103(a) appearing in the Examiner's Action dated March 18, 2003, require that the modified Bowater, et al. patent be combined with at least one other reference, the controlling legal authority unarguably declares that such claims traverse rejection for obviousness.

Claim 4 Is Allowable
Over the Cited References

First Appellant observes that the Examiner's Action dated March 18, 2003, rejects dependent claim 4 for obviousness under 35 U.S.C. § 103(a) based upon the Bowater, et al. and Davis, et al. patents as applied to claims 1-3 and 5-7, and further in view of the Florencio patent. Since for the reasons set forth above a combination of the Bowater, et al. and Davis, et al. fails to render claims 1-3 and 5-7 obvious under 35 U.S.C. § 103(a), a

combination of those references with the disclosure of the Florencio patent cannot render dependent claim 4 obvious.

However, since dependent claim 4 stands rejected by the Examiner's Action dated March 18, 2003, based upon on a combination of references which differs from that upon which it rejects claims 1-3 and 5-7, to demonstrate that dependent claim 4 traverses rejection for obviousness Appellant will independently analyze the disclosure of the Florencio patent as applied in rejecting dependent claim 4.

Dependent claim 4 limits the scope of independent claim 1 from which it depends by requiring that:

> parameters used in encoding the data for the still image produce an amount of data for the I frame that approaches, but remains less than, storage capacity of a buffer memory included in a decoder that stores the compressed video bitstream.

In rejecting dependent claim 2 for obviousness under 35 U.S.C. § 103(a), the Examiner's Action dated March 18, 2003, in lines 1 through 7 of the last full paragraph on page 6 declares:

> [t]he combination of Bowater et al and Davis et al discloses substantially the same method for producing a compressed video bitstream as above, but does not particularly disclose wherein parameters used in encoding the data for the still image produce an amount of data for the I frame that approaches, but remains less than, storage capacity of a buffer memory included in a decoder that stores the compressed video bitstream as claimed in claim 4. The particular storage of compressed video bitstreams within a decoder is however old and well recognized in the art, as exemplified by Florencio (see 111 of Figure 1 and column 5, lines 1-12).

The text of the Florencio patent identified in the preceding excerpt from the Examiner's Action set forth above. The Appellant

is unable to find in that text quoted from the Florencio patent, which includes all of the text identified in the Examiner's Action dated March 18, 2003, any disclosure that the "variable length encoded bitstream representing, e.g., a high definition television signal (HDTV) or standard definition television signal (SDTV) output from a transport demultiplexer/decoder circuit" received by the "input buffer memory module 111" of the "MPEG-like decoder 100" for a single I frame contains an amount of data that approaches, but remains less than, storage capacity of the "input buffer memory module 111" as alleged in the Examiner's Action dated March 18, 2003, beginning at the bottom of page 5 and continuing to the top of page 6. Appellant is actually unable to find anywhere in the Florencio patent any disclosure of the amount of "variable length encoded bitstream" which the "input buffer memory module 111" may receive for a single encoded frame of video, or how the amount of "variable length encoded bitstream" received by "input buffer memory module 111" relates to the size of the "input buffer memory module 111."

Furthermore, despite a diligent search the Appellant cannot find **anywhere** in the disclosure of the Florencio patent anything about "parameters employed in encoding the data for [an] image" as required by the text of pending dependent claim 4. Since the text of dependent claim 4 expressly requires that:

> **parameters employed in encoding the data for the still image** produce an amount of data for the I frame that approaches, but remains less than, storage capacity of a

> buffer memory included in a decoder that stores the compressed video bitstream,

even if contrary to fact the Florencio patent were to disclose that the "input buffer memory module 111" received:

> an amount of data for the I frame that approaches, but remains less than, storage capacity of a buffer memory included in a decoder that stores the compressed video bitstream,

the reference fails to disclose that the amount of data received by the "input buffer memory module 111" is controlled by parameters employed in encoding the image data.

Claims 2 and 3 Are Allowably Definite

The Examiner's Action dated March 18, 2003, continues maintaining a rejection of claims 2 and 3 set forth in an Examiner's Action dated February 12, for being indefinite under 35 U.S.C. § 112, second paragraph. Claim 2 requires that:

> the assembled compressed video bitstream is decodable in accordance with the MPEG-1 standard . . .

Claim 3 requires that:

> the assembled compressed video bitstream is decodable in accordance with the MPEG-2 standard . . .

In maintaining the rejection of claims 2 and 3, the Examiner's Action dated February 12, 2002, states:

> [t]he particular claim to the "MPEG-1" and "MPEG-2" recommendations as shown in claims 2 and 3, respectively, are indefinite because there are many versions of the MPEG-1 and MPEG-2 recommendations and the recommends are continuously updated. The scope of the claim limitations cannot change over time, and unless the specification states a specific MPEG-1 and MPEG-2 version and date or

> a copy of the MPEG-1 and MPEG-2 recommendations are provided, the claims are indefinite. The recommendations are constantly changing, even up to the filing date of the application. Basically, the time frame between when the invention was reduced to practice till the time the application is filed, for example, there could be various versions of the recommendations. And unless the versions and dates of the recommendations are provided, the metes and bounds of the claimed limitations are not clearly set forth, and thus renders the claims indefinite.

First, it appears that the issue of the "Risk of the Future" which underlies the preceding rejection frequently arises in the context of claim rejections for lack of enablement rather than for claim indefiniteness. See Chisum § 7.03[3][c] and In re Metcalfe, 410 F.2d 1378, 161 USPQ 789 (CCPA 1969). In re Metcalfe holds that insufficiency of disclosure rejections due to "Risk of the Future" are to be decided on a case-by-case basis using a rule of reason analysis. Id. at 1382, 792. In re Metcalfe observes that there always exist a "possibility," however remote, that at some future date a material or an apparatus might no longer be available for practicing a patented invention, but that **the existence of such a risk should not bar the issuance of a patent in every instance**.

In *Ex parte* Saceman, 27 USPQ2d 1472, 1474 (Bd. Pat. App. & Int'f 1993), the Board of Appeals, following the holding of In re Metcalfe, held that "Risk of the Future" indefiniteness of claim terms must also be decided using a rule of reason analysis applied to the facts of the case. In *Ex parte* Logan, 20 USPQ2d 1465, 1469-70 (Bd. Pat. App. & Int'f 1991), the Board of Appeals ordered that a patent issue on an application having a specification which

used "pseudo-code", metaphors and relative terminology to describe a computer-implemented patient inspiration detection method.

In the present application, the two Examiner's Action rejections of claims 2 and 3 quoted above allege that the claims will become indefinite "because there are many versions of the MPEG-X recommendations and the recommends are continuously updated." Appellant observes that the various versions of the MPEG-[X] specification have all been published by the International Organization for Standardization ("ISO") and/or International Electrotechnical Commission ("IEC"). Thus, the use of metaphors and relative terminology, respectively MPEG-1 and MPEG-2 in claims 2 and 3 that Board of Appeals approved for computer related inventions in In *Ex parte* Logan, is reasonable for pending claims 2 and 3 because there exist little likelihood that ISO's and/or IEC's publications of the MPEG-1 and MPEG-2 specifications will become unavailable during the term of a patent issuing on the present application.

If need there be for further evidence that the rejection of claims 2 and 3 for indefiniteness under 35 U.S.C. § 112, second paragraph, is specious, the declaration of Mark Conover which accompanied a response to an October 11, 2002, Examiner's Action which was received by the USPTO on January 13, 2003, establishes that:

> despite minor changes occurring in the MPEG specification the invention disclosed and claimed in my patent application has been used successfully without change by one

customer who has used it for several years probably in millions of instances!

Conclusion

The evidence cited throughout this voluminous Appeal Brief establish for detailed reasons appearing in titled sections A through E above that the Bowater, et al. patent fails to disclose or to even suggest:

1. fetching the data for a still image;[20] or

2. encoding data for a single still image into an I frame;[21] or

3. storing the encoded I frame data;[22] or

4. combining data for at least a single copy of an I frame and at least one null frame:[23] or

---

[20] Rather, the Bowater, et al. patent discloses a conventional television camera producing motion video at a 15 frame per second rate. See column 3, lines 21-23 and column 3, lines 46-49.

[21] Rather the Bowater, et al. patent discloses the spatial and temporal compression of a series of frames of video data received from a television camera at 15 frames per second into "still frames," i.e. I frames, and "relative frames." See column 4, lines 42-68.

[22] Neither of the cited references, but only the present application discloses storing the I frame data produced by encoding the data for a single still image.

[23] The Bowater, et al. patent first discloses that compressed data for sequences of motion video frames would be so temporally distorted as to be unwatchable at the destination computer 6 without buffering. See column 3, lines 59-63. Then the Bowater, et al. patent discloses that adding buffers to the destination computer 6 makes compressed data for sequences of motion video frames

5. that the combination of a single copy of an I frame and at least one null frame prevents an image from appearing to pulse visually.[24]

Furthermore, Appellant respectfully submits that for the detailed reasons appearing in titled section E there exists no motivation or suggestion to combine the disclosures of Bowater, et al. and the Davis, et all patents.

Not only does the combination of the Bowater, et al. patent fail to disclose or to even suggest essential method steps in the invention encompassed by pending independent claim 1, and not only do the Bowater, et al. and Davis, et al. patents lack a motivation or suggestion for their combination to obtain the invention encompassed by pending independent claim 1, for the detailed reasons set forth above all rejections of claims for obviousness under 35 U.S.C. § 103 necessarily requires modifying the disclosure of the Bowater, et al. patent to such an extent that it is no longer useful for its intended purpose. Under controlling legal

---

viewable. However, if due to network delays compressed video data fails to arrive at the destination computer 6 the displayed image freezes. See column 3, line 65 through column 4, line 3. Finally, the Bowater et al. patent discloses inserting null frames into the buffer of the destination computer 6 when compressed video data fails to arrive due to network delays. However, even if null frames are inserted into the buffer a viewer still sees the image freeze. See column 4, 22-26.

[24] The Bowater, et al. patent discloses only that if due to network delays compressed video data fails to arrive at the destination computer 6 the displayed image freezes. See column 3, line 65 through column 4, line 3, and column 4, 22-26.

authority, such a modification of the disclosure of the Bowater, et al. patent is an unobvious modification which destroys that reference as a basis for rejecting pending claims 1-7 for obviousness under 35 U.S.C. § 103.

For each of the three independent and distinct reasons set forth above, Appellant respectfully submits that:

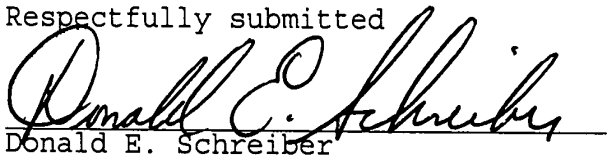
1. twice amended independent claims 1 together with claims 2-7 depending therefrom:
   a. traverse rejection for obviousness under 35 U.S.C. § 103(a) based upon a combination of the Bowater, et al. patent with any other reference(s); and
   b. are allowable over the combinations of references set forth in the Examiner's Action dated March 18, 2003; and
2. therefore the rejection of claims 1-7 for obviousness under 35 U.S.C. § 103(a) set forth in the Examiner's Action dated March 18, 2003, must be overruled.

Moreover, for the reasons set forth above a combination of the disclosures of the Bowater, et al. and Davis, et al. patents with the disclosure of the Florencio patent fails to disclose or to suggest the invention encompassed by dependent claim 4. Therefore the rejection of claim 4 for obviousness under 35 U.S.C. § 103(a) set forth in the Examiner's Action dated March 18, 2003, must also be overruled.

Finally, for the reasons set forth in greater detail above, the rejection of claims 2 and 3 for indefiniteness under 35 U.S.C. § 112, second paragraph, set forth in the March 18, 2003, Examiner's Action must also be overruled.

For all the various reasons set forth above, the rejection of claims in the Examiner's Action dated March 18, 2003, which has compelled filing this second Appeal Brief must be overruled, and this application after pending in the USPTO for almost five (5) years must pass to issue.

Respectfully submitted



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APPENDIX I
CLAIMS

1. A method for producing a compressed video bitstream that includes compressed video data for a plurality of frames from data that specifies a single still image, the method comprising the steps of:

fetching the data for the still image;

encoding the data for the single still image into data for an I frame;

storing the encoded I frame data; and

assembling the compressed video bitstream by appropriately combining data for:

at least a single copy of the stored I frame;

at least one null frame; and

various headers required for decodability of the compressed video bitstream;

whereby decoding of the compressed video bitstream produces frames of video which produce images that do not appear to pulse visually.

2. The method of claim 1 wherein:

the assembled compressed video bitstream is decodable in accordance with the MPEG-1 standard; and

the various headers assembled into the compressed video bitstream include:

a sequence_header beginning the compressed video bitstream;

at a beginning of group of pictures, a group_start_code;

for each encoded frame, a picture_start_code; and

a sequence_end_code ending the compressed video bitstream.

3. The method of claim 1 wherein:

the assembled compressed video bitstream is decodable in accordance with the MPEG-2 standard; and

the various headers assembled into the compressed video bitstream include:

a sequence_header beginning the compressed video bitstream;

for each encoded frame:

a picture_header; and

a picture_coding_extension; and

a sequence_end_code ending the compressed video bitstream.

4. The method of claim 1 wherein parameters used in encoding the data for the still image produce an amount of data for the I frame that approaches, but remains less than, storage capacity of a buffer memory included in a decoder that stores the compressed video bitstream.

5. The method of claim 1 wherein null frames assembled into the compressed video bitstream also include bitstream stuffing

whereby the compressed video bitstream is transmittable at a pre-established bitrate.

6. The method of claim 1 wherein the various headers assembled into the compressed video bitstream include:

a sequence_header beginning the compressed video bitstream;

at a beginning of group of pictures, a group_start_code;

for each encoded frame, a picture_start_code; and

a sequence_end_code ending the compressed video bitstream.

7. The method of claim 1 wherein the various headers assembled into the compressed video bitstream include:

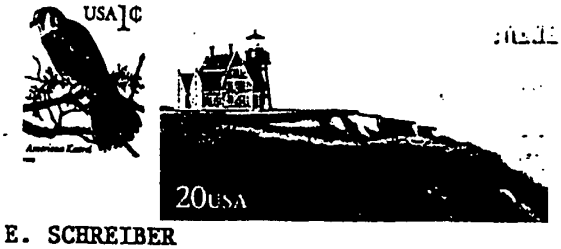
a sequence_header beginning the compressed video bitstream;

for each encoded frame:

a picture_header; and

a picture_coding_extension; and

a sequence_end_code ending the compressed video bitstream.



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APPLICANT: Mark D. Conover DOCKET NO: 2134
SERIAL NO: 09/168,644 Examiner: Richard Lee
FILED: October 08, 1998 (10.08.98) Art Unit: 2613
FOR: ENCODING A STILL IMAGE INTO COMPRESSED VIDEO

APPLICANT: Mark D. Conover DOCKET NO: 2134
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FILED: October 08, 1998 (10.08.98) Art Unit: 2613
FOR: ENCODING A STILL IMAGE INTO COMPRESSED VIDEO

EMARK OFFICE

's Action

(1) Month exten-
Fee

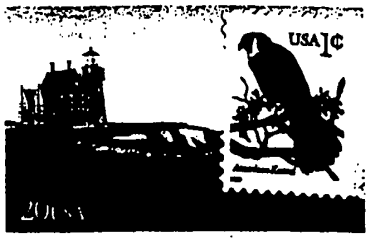
RECEIVED IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

1. Transmittal Letter
2. Full and complete Response to an Examiner's Action dated June 8, 2001, paper #5.
3. a Check in the amount of $215.00 ($55.00 (1) Month extension and $160.00 Notice of Appeal Filing Fee
4. Notice of Appeal

EXHIBIT A

o. 2134

EXHIBIT A



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DATE: Dec 7, 2001

AMOUNT: *********$160.00

Memo:

PAY One Hundred Sixty and 00/100 Dollars

TO THE ORDER OF: Dir. of Patents and Trademarks
Washington, DC 20231
USA

Donald E. Schreiber
AUTHORIZED SIGNATURE

APPLICANT: Mark D. Conover

DOCKET NO: 2134

SERIAL NO: 09/168,644

FILED: October 8, 1998

FOR: ENCODING A STILL IMAGE INTO COMPRESSED VIDEO

DOCKET NO: 2134

RECEIVED IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

1. Appeal Brief
2. a Check in the amount of$160.00 for Appeal Brief filing fee
3. Appeal Brief Transmittal Letter

Docket no. EXHIBIT B

EXHIBIT B

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/168,644	10/08/1998	MARK D. CONOVER	2134	2742

7590 02/12/2002

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EXAMINER
LEE, RICHARD J

ART UNIT	PAPER NUMBER
2613	

DATE MAILED: 02/12/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Docket no. 2134

Exhibit C

EXHIBIT C

Office Action Summary	Application No. 09/168,644	Applicant(s) Conover
	Examiner Richard Lee	Art Unit 2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Dec 7, 2001*.

2a) ☐ This action is **FINAL.** 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-7* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-7* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)
16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
18) ☐ Interview Summary (PTO-413) Paper No(s). _____
19) ☐ Notice of Informal Patent Application (PTO-152)
20) ☐ Other:

1. In view of the Brief filed December 7, 2001 and the newly discovered Gordon (6,324,217) and Florencio (6,310,919) references, the finality of the last Office Action is hereby withdrawn. A non-final Office Action follows. The Examiner apologizes for any inconvenience that this may have caused.

2. Claim 4 is objected to because of the following informalities: At claim 4, line 1, "employed" should be changed to "used" for clarity. Appropriate correction is required.

3. Claims 2 and 3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The particular claim to the "MPEG-1" and "MPEG-2" recommendations as shown in claims 2 and 3, respectively, are indefinite because there are many versions of the MPEG-1 and MPEG-2 recommendations and the recommends are continuously updated. The scope of the claim limitations cannot change over time, and unless the specification states a specific MPEG-1 and MPEG-2 version and date or a copy of the MPEG-1 and MPEG-2 recommendations are provided, the claims are indefinite. The recommendations are constantly changing, even up to the filing date of the application. Basically, the time frame between when the invention was reduced to practice till the time the application is filed, for example, there could be various versions of the recommendations. And unless the versions and dates of the recommendations are provided, the metes and bounds of the claimed limitations are not clearly set forth, and thus renders the claims indefinite.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/168,644	10/08/1998	MARK D. CONOVER	2134	2742

7590 10/11/2002

DONALD E SCHREIBER
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SUNNYVALE, CA 940884150

EXAMINER
LEE, RICHARD J

ART UNIT	PAPER NUMBER
2613	

DATE MAILED: 10/11/2002

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EXHIBIT D

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7590 03/18/2003

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2613	

DATE MAILED: 03/18/2003

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EXHIBIT E

US005404446A

United States Patent [19]

Bowater et al.

[11] Patent Number: 5,404,446

[45] Date of Patent: Apr. 4, 1995

[54] **DUAL BUFFER VIDEO DISPLAY SYSTEM FOR THE DISPLAY OF ASYNCHRONOUS IRREGULAR FRAME RATE VIDEO DATA**

[75] Inventors: **Ronald J. Bowater**, Romsey; **Barry K. Aldred**, Winchester; **Steven P. Woodman**, Romsey, all of England

[73] Assignee: **International Business Machines Corporation**, Armonk, N.Y.

[21] Appl. No.: 37,197

[22] Filed: Mar. 26, 1993

[30] Foreign Application Priority Data

Mar. 26, 1992 [GB] United Kingdom 9206554

[51] Int. Cl.[6] G06F 15/20

[52] U.S. Cl. 395/162

[58] Field of Search 395/101, 162, 164, 200, 395/250; 358/85, 86, 183, 903; 370/62; 380/18; 382/56; 345/185, 186, 189, 192, 196, 200

[56] References Cited

U.S. PATENT DOCUMENTS

4,027,100	5/1977	Ishiguro	178/69.1
4,394,774	7/1983	Widergren et al.	382/56
4,949,169	8/1990	Lumelsky et al.	358/86
4,995,071	2/1991	Weber et al.	379/53
5,014,267	5/1991	Tompkins et al.	370/62
5,062,136	10/1991	Gattis et al.	380/18
5,192,999	3/1993	Graczyk et al.	358/85
5,262,965	11/1993	Putnam et al.	395/101

FOREIGN PATENT DOCUMENTS

0031031	7/1981	European Pat. Off.	G06F 13/00
0382182	8/1990	European Pat. Off.	G06F 13/12
0274703	7/1988	Germany	G06F 3/06
8600482	1/1986	WIPO	H04L 25/49

OTHER PUBLICATIONS

SMPTE Journal, vol. 85, Jun. 1976, pp. 385-388, Matley, "A Digital Framestore Synchronizer".

IBM Technical Disclosure Bulletin, vol. 10, No. 1, Jun. 1967, pp. 34-36, H. E. Jenkins et al., "Asynchronous Control of Data Transfer".

Primary Examiner—Mark R. Powell
Assistant Examiner—U. Chauhan
Attorney, Agent, or Firm—Martin J. McKinley

[57] ABSTRACT

7 Claims, 1 Drawing Sheet

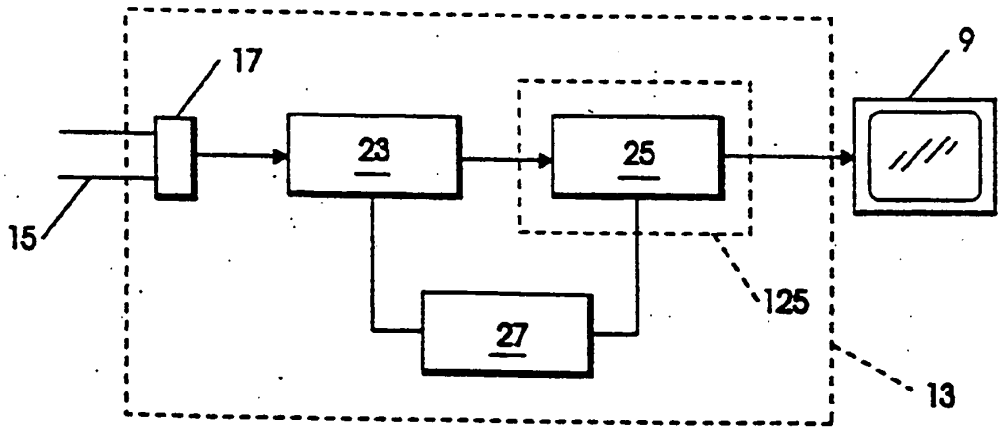


FIG. 1

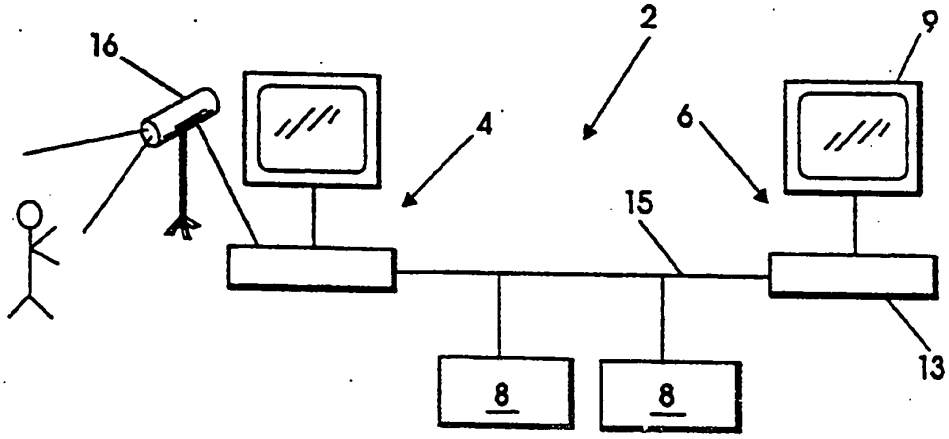
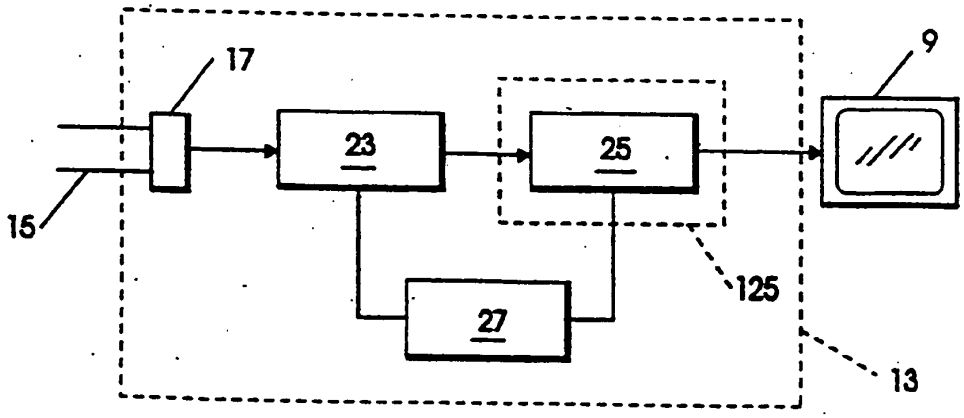


FIG. 2



Docket no. 2134

EXHIBIT F

DUAL BUFFER VIDEO DISPLAY SYSTEM FOR THE DISPLAY OF ASYNCHRONOUS IRREGULAR FRAME RATE VIDEO DATA

BACKGROUND OF THE INVENTION

In computer-based video communication systems, a video signal is obtained from the camera at a constant frame rate but, after transmission across the asynchronous or non-ideal network, the frames arrive at irregular intervals. Some frames arrive early, some are delayed, and bunching can occur. The display device at the receiving terminal, however, generally requires a constant frame rate supplied to it (e.g., to match the raster scan rate of a CRT). In such systems it is therefore necessary to match the irregular arrival of frames over the network with the constant supply required to the output screen.

. The designer of computer based video communication systems is therefore faced with the problem of how to achieve regular play-out of the asynchronous incoming video signal while, at the same time, minimising the number of buffered video frames.

FIG. 1 shows a network 2 of computers 4, 6, 8 connected by an asynchronous communication channel 15 (e.g., LAN or ISDN). A camera 16 at a first computer 4 obtains a video signal, normally of the user, which is compressed and submitted to the network. The signal is then transmitted down the communication channel in packet format before arriving at the destination computer 6. Typically, this second computer includes hardware such as the Intel/IBM ActionMedia II (AMII) card, which is responsible for actually decompressing and displaying the video image on the screen 9. In video conferencing applications, the reverse process also occurs; i.e., the second computer is simultaneously sending an image of its user back to the first computer 4 for display. It is also possible to set up multi-way conferences.

With reference now to FIG. 2, the incoming video signal from the communication subsystem 15 arrives at the workstation 13 for display on the associated monitor 9. The signal is transferred first to a buffer 23, and then to the AMII card 125 or, more particularly, to the AudioVisual Kernel (AVK) interface buffer 25 of the AMII card. The buffer 23 provides a FIFO queue, conveniently implemented as a circular buffer. A control process 27 is responsible first for reading incoming data into the circular buffer, and then for transferring data from the circular buffer to the AVK.

Video images are captured at the source computer at a frame rate of 15 frames per second (in this particular embodiment), which is sufficient to provide moderate quality video. This is also the rate at which they are read out of the AVK to the screen. However, the transmission rate over the network is variable, depending on network load, etc., so that the arrival rate at the end of the computer subsystem departs from this 15 Hz clock. Changes in CPU activity at the source and destination computers can also lead to variations in the effective frame arrival rate. Individual frames can have either a positive or negative offset from their nominal arrival time, although it is assumed that frames do, in fact, arrive in the correct sequence. It should be noted that the variation in arrival times is such that, even if the hardware could display each frame directly on arrival, the resulting sequence would be so temporally distorted as to be unwatchable.
essential.

Together, the AVK and circular buffer compensate for the variable arrival rate of the video frames by introducing a time-lag, T(L), between the received and displayed images. Any frame arriving within T(L) of its nominal arrival time can be properly displayed. Only if a frame arrives more than T(L) late, will the AVK and circular buffer empty and the video image will freeze. To decrease the risk of buffer starvation, the buffer size can be increased to make T(L) larger, but with a 15 frames per second transmission rate, storing only 10 frames adds a delay of ⅔ second. If the effectiveness of interactive applications such as video conferencing is not to be seriously degraded, only a handful of frames can be buffered with T(L) correspondingly small.

The control process is responsible first for receiving data into the circular buffer, and then for forwarding it to the AVK. There is no control over output from the AVK, which is at a fixed rate. As explained in more detail below, the AVK requests frames from the circular buffer as required. Clearly, if frames are present in the circular buffer, then these can be forwarded to the AVK. However, in video conferencing or other interactive applications where the overall amount of buffering is limited, there may occasionally be particularly long delays on the network during which time the circular buffer empties. In this case, the control process reacts by loading the AVK with null frames. A null frame is essentially the same as the preceding frame, so that, as far as the viewer is concerned, video image temporarily freezes. Thus, each time the control process fails to find frames in the circular buffer, the requisite number of null frames are loaded into the AVK instead.

Although the user may not notice the insertion of individual null frames, each null frame adds to the overall delay in the system (i.e., it is effectively another form of buffering). If more and more null frames are inserted into the video stream, then this will, again, lead to an intrusive delay between transmission and display. This problem can be overcome by the circular buffer throwing away real data when the delayed frames do finally arrive. These frames are then effectively lost, allowing the displayed image to catch up with the incoming signal. It is the presence of two buffers that gives the flexibility to lose frames in this way, and so cope with occasional delays longer than T(L).

The technique used to discard frames exploits the fact that, due to the limited bandwidth of the channel, the video signal is compressed before transmission over a computer based communication line. Basically, two types of compression, spatial and temporal, are used. In the former, the redundancy within a single frame is removed, for example, by using the fact that adjacent pixels often have closely related brightness and color values. A frame encoded using only spatial compression is known as a "still frame". Temporal compression achieves a further level of compression by exploiting the fact that the luminosity and color of the same pixel in two consecutive frames are, again, likely to be highly correlated. Therefore, in temporal compression, a frame is encoded as a "relative frame" in terms of its difference from the previous frame (we assume that a relative frame is also spatially compressed). The greatest reduction in data is achieved if every frame (apart from the first) is a relative frame, but this is highly error prone since the loss of a single frame will produce defects that persist for all subsequent frames. Therefore, as a compromise, every Nth frame can be sent as a still frame, with all intervening frames as relative frames, so that the result of compression is a regularly spaced series of frames whose size varies somewhat according to the temporal and spatial content of the data and, of course, whether that particular frame is a still or relative frame.

When the buffer is not full, then incoming frames can be added to the buffer in the normal way. However, when the buffer is full, there are two possible actions. If the incoming frame is a still frame, then the entire buffer is flushed before the incoming still frame is added to the queue. Alternatively, if the incoming frame is a relative frame, then only relative frames below (i.e., that arrived earlier than) a still frame are flushed. This is because the previous still frame is still required to make sense of the relative frames. In either case, flushing the buffer results in some frames being thrown away, and so the displayed image catches up slightly with the received image.

Turning now to the AVK, frames are read out from the AVK for display at a fixed rate. This leads to the possibility of buffer starvation if the AVK contains no more frames to read out to the screen. In such an eventuality, the AVK pipeline needs to be reset, requiring a considerable system overhead during which time the video image is not updated, in contrast to the circular buffer, which can be emptied and refilled without penalty.

Accordingly, a lower limit, V(L), is set for the number of frames in the AVK. This value is selected to substantially preclude buffer starvation yet, at the same time, not introduce an unacceptable delay. The control process responsible for transferring frames from the circular buffer to the AVK then tries to maintain the number of frames in the AVK as close as possible to but slightly above V(L).

Once the control process has determined the number of frames to transfer to the AVK, it can either send this as a single request, or as an appropriate number of requests for individual frames. In the latter case, the circular buffer can respond simply to each request by transferring a frame if available, or inserting a null frame if not.

Docket no. 2134

EXHIBIT F

US005838678A

United States Patent [19]

Davis et al.

[11] Patent Number: 5,838,678

[45] Date of Patent: Nov. 17, 1998

[54] **METHOD AND DEVICE FOR PREPROCESSING STREAMS OF ENCODED DATA TO FACILITATE DECODING STREAMS BACK-TO BACK**

[76] Inventors: **Joseph W. Davis**, 2776 Peachtree Walk; **Shawn M. Hayes**, 1100 N. Court Dr., both of Duluth, Ga. 30136

[21] Appl. No.: **686,629**

[22] Filed: **Jul. 24, 1996**

[51] **Int. Cl.**[6] **H04J 3/24**

[52] **U.S. Cl.** **370/389**

[58] **Field of Search** 370/389, 493, 370/496, 498, 535, 536, 537, 538, 539, 540, 541, 542, 543, 474, 476, 477; 348/461, 462, 466, 467, 390, 395, 396, 394, 404, 409, 12, 13, 19, 607, 391, 400, 412, 384

[56] **References Cited**

U.S. PATENT DOCUMENTS

5,612,900	3/1997	Azadegan et al.	364/514 R
5,623,424	4/1997	Azadegan et al.	364/514 R

Primary Examiner—Dang Ton

Attorney, Agent, or Firm—Sawyer & Associates

[57] **ABSTRACT**

A method and device for preprocessing streams of encoded data (e.g. compressed in accordance with an MPEG standard) to permit a decoder to decode the streams, back-to-back (i.e., one stream immediately following another), without being reset and without producing video artifacts. The present invention includes verifying that a multiplexed stream complies with an encoding standard and preprocessing packets of the packetized encoded video sequence such that no video artifacts are produced when a video decoder decodes an adjacent encoded video sequence.

17 Claims, 16 Drawing Sheets

Docket no. EXHIBIT G

EXHIBIT G

FIG. 1
(PRIOR ART)

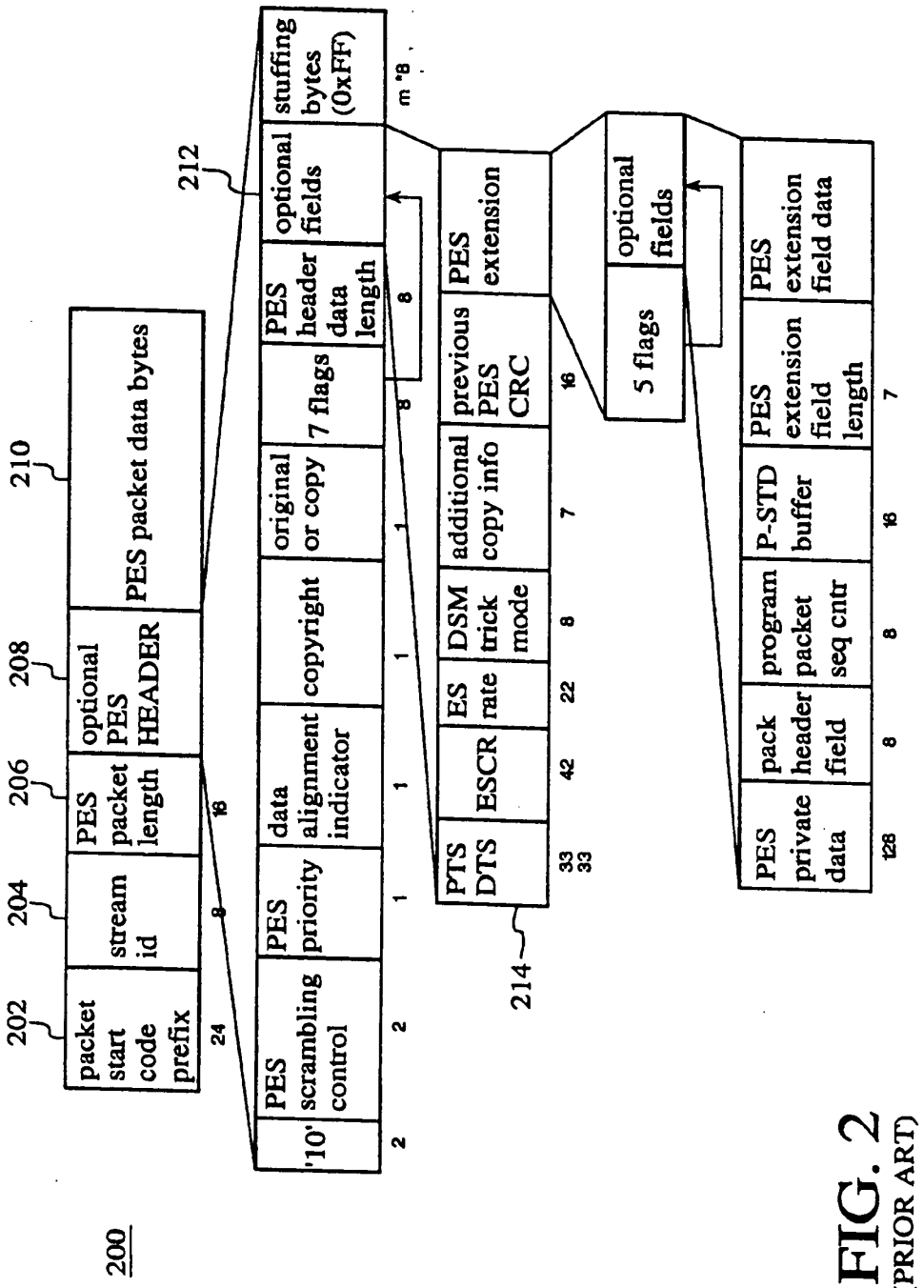


FIG. 2
(PRIOR ART)

Docket no. 2134

EXHIBIT G

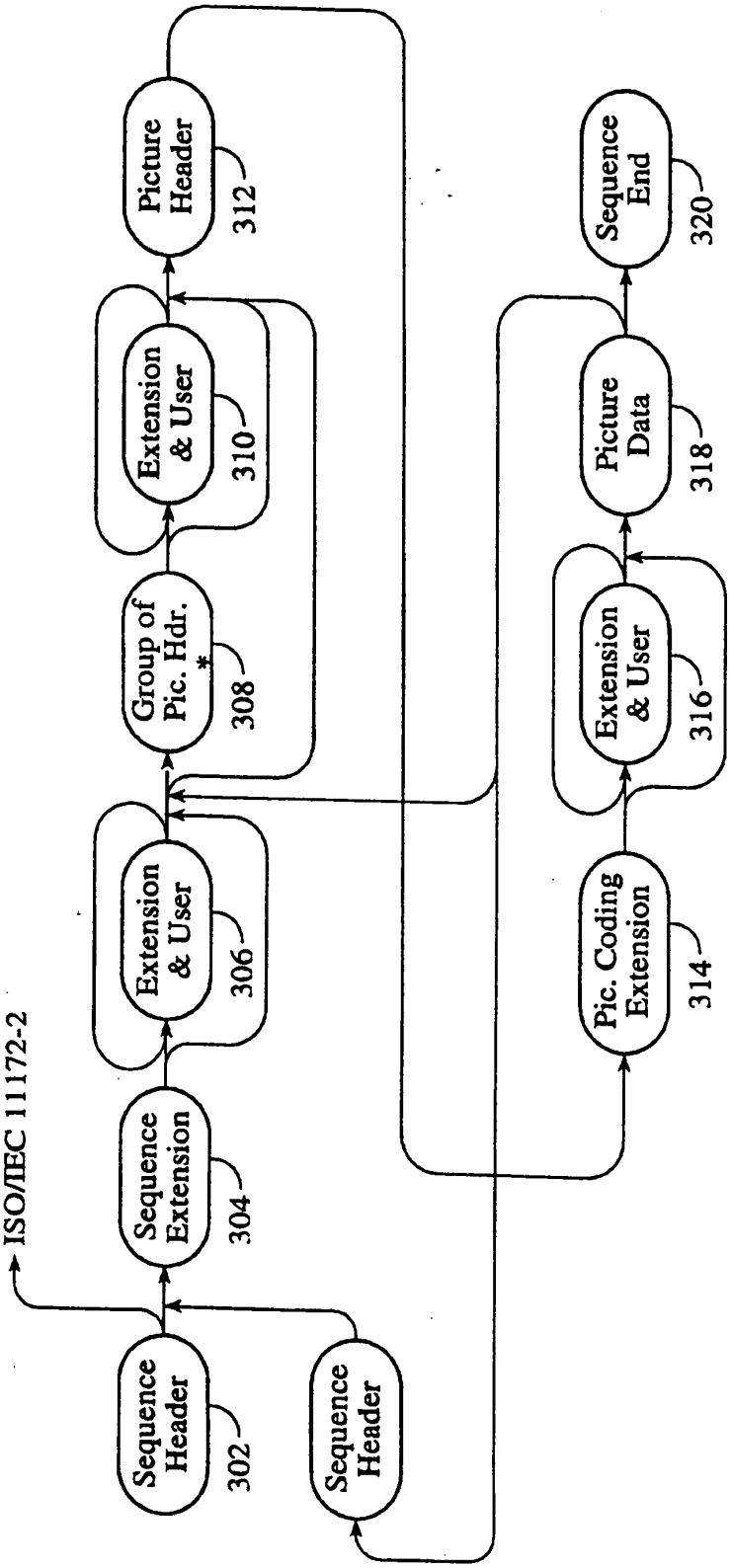


FIG. 3A
(PRIOR ART)

video_sequence0 {	300	No. of bits	Mnemonic
next_start_code0			
sequence_header0	302		
if (nextbits0 = extension_start_code) {			
sequence_extension0	304		
do {			
extension_and_user_data(0)	306		
do {			
if (nextbits0 = group_start_code) {			
308 group_of_pictures_header0			
310 extension_and_user_data(1)			
}			
312 picture_header0			
314 picture_coding_extension0			
316 extensions_and_user_data(2)			
318 picture_data0			
} while ((nextbits0=picture_start_code) ||			
(nextbits0 = group_start_code))			
if (nextbits0! = sequence_end_code) {			
sequence_header0			
sequence_extension0			
}			
} while(nextbits0!=sequence_end_code)			
} else {			
/*ISO/IEC 11172-2 */			
}			
sequence_end_code	320	32	bslbf
}			

FIG. 3B
(PRIOR ART)

FIG. 4
(PRIOR ART)

picture_header0 { 312	No. of bits	Mnemonic
picture_start_code 502	32	bslbf
temporal_reference 504	10	uimsbf
picture_coding_type	3	uimsbf
vbv_delay	16	uimsbf
if(picture_coding_type = 2 || picture_coding_type = 3) {		
full_pel_forward_vector	1	
forward_f_code	3	uimsbf
}		
if (picture_coding_type = 3) (		
full_pel_backward_vector	1	
backward_f_code	3	uimsbf
}		
while (nextbits0 = '1') {		
extra_bit_picture /* with the value '1' */	1	uimsbf
extra_information_picture	8	
}		
extra_bit_picture /* with the value '0' */	1	uimsbf
next_start_code0		
}		

FIG. 5 (PRIOR ART)

group_of_pictures_header0 { 308	No. of bits	Mnemonic
group_start_code ~604	32	bslbf
time_code	25	bslbf
closed_gop ~602	1	uimsbf
broken_link	1	uimsbf
next_start_code0		
}		

FIG. 6 (PRIOR ART)

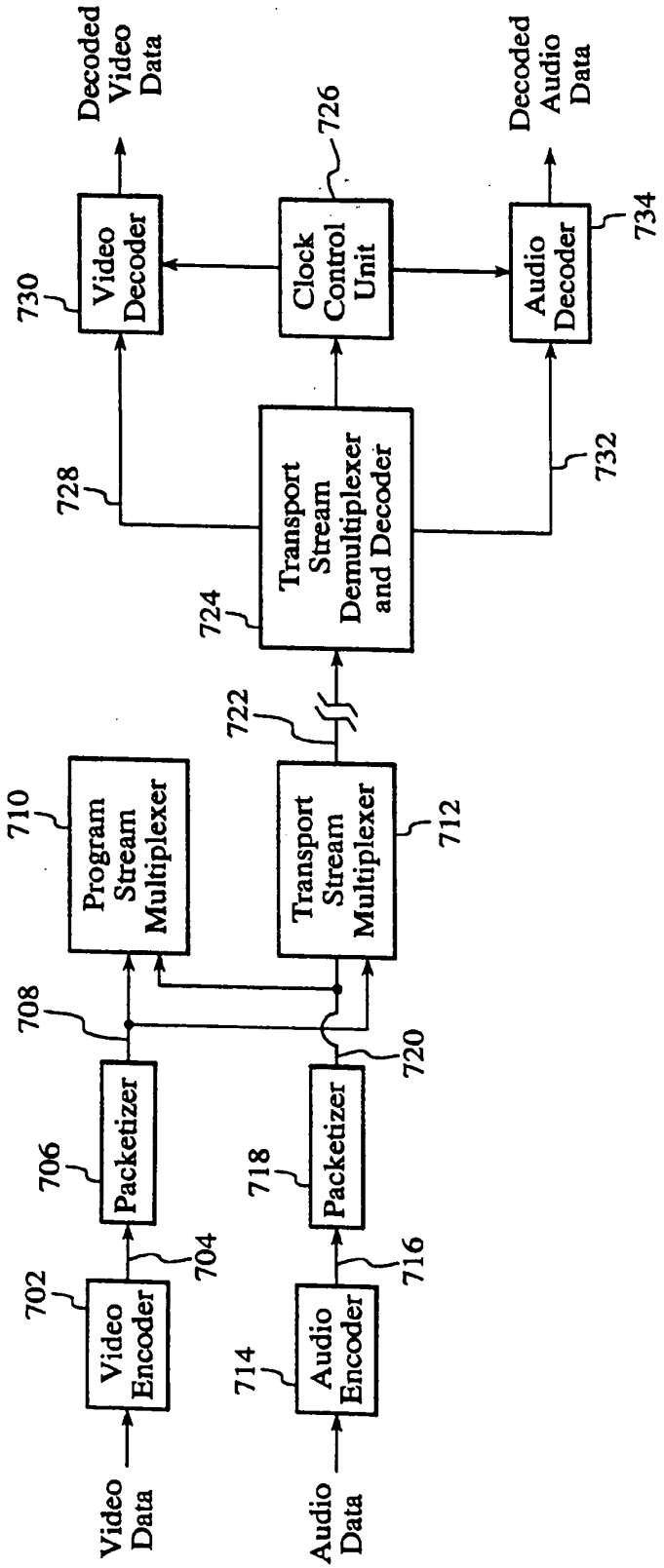


FIG. 7
(PRIOR ART)

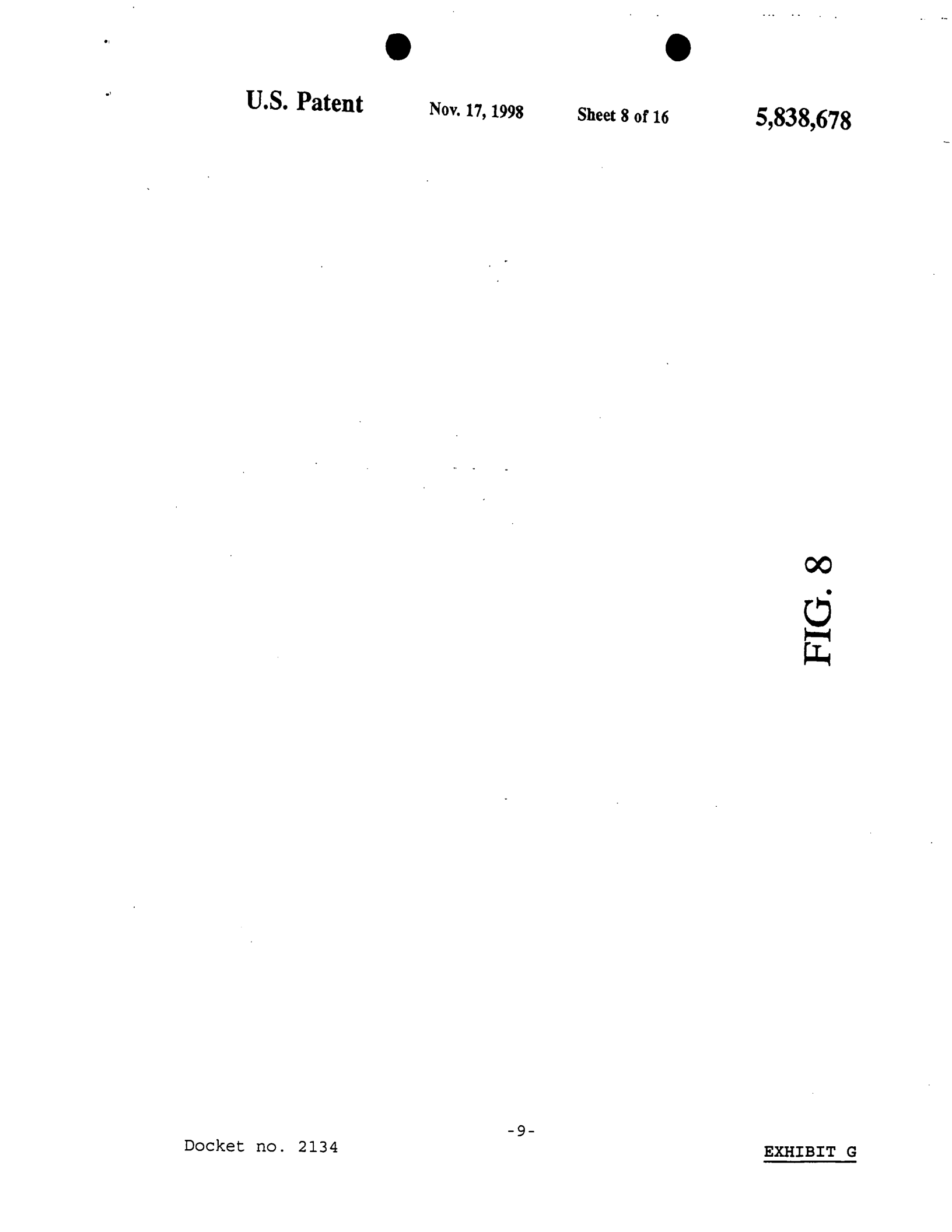


FIG. 8

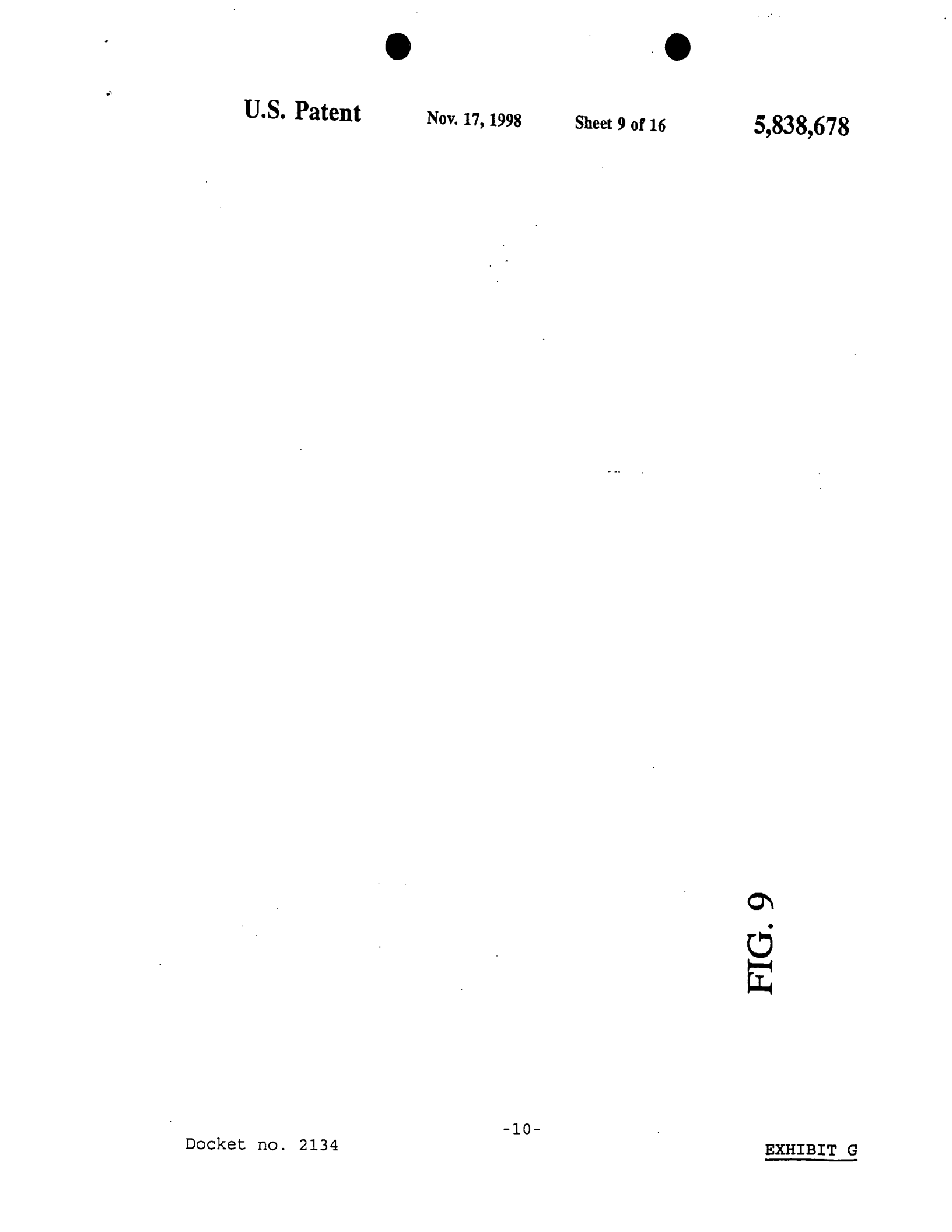


FIG. 9

FIG. 10

FIG. 11
(PRIOR ART)

FIG. 12

FIG. 13

FIG. 14

FIG. 15

FIG. 16

METHOD AND DEVICE FOR PREPROCESSING STREAMS OF ENCODED DATA TO FACILITATE DECODING STREAMS BACK-TO BACK

BACKGROUND OF THE INVENTION

a. Field of the Invention

b. Related Art

The MPEG standard focuses on the encoding and transport of video and audio data. In general, the MPEG standard uses compression algorithms such that video and audio data may be more efficiently stored and communicated.

The International Organization for Standardization (or the Organization International De Normalisation) (hereinafter referred to as "the ISO/IEC") has produced the MPEG II standard for the coding of moving pictures and associated audio. This standard is set forth in four documents. The document ISO/IEC 13818-1 (systems) specifies the system coding of the specification. It defines a multiplexed structure for combining audio and video data and means of representing the timing information needed to replay synchronized sequences of the audio and video data in real-time. The document ISO/IEC 13818-2 (video) specifies the coded representation of video data and the decoding process required to reconstruct pictures. The document ISO/IEC 13818-3 (audio) specifies the coded representation of audio data and the decoding process required to reconstruct the audio data. Lastly, the document ISO/IEC 13818-4 (conformance) specifies procedures for determining the characteristics of coded bitstreams and for testing compliance with the requirements set forth in the ISO/IEC documents 13818-1, 13818-2, and 13818-3. These four documents, hereinafter referred to, collectively, as "the MPEG II standard" or simply "the MPEG standard", are incorporated herein by reference.

A bit stream, multiplexed in accordance with the MPEG standard, is either a "transport stream" or a "program stream". Both program and transport streams are constructed from "packetized elementary stream" (or PES) packets and packets containing other necessary information. A "packetized elementary stream" (or PES) packet is a data structure used to carry "elementary stream data". An "elementary stream" is a generic term for one of (a) coded video, (b) coded audio, or (c) other coded bit streams carried in a sequence of PES packets with one and only stream ID.

FIG. 2 is a diagram which illustrates the syntax of a PES packet **200**.

The payload **210** of a PES packet **200** may carry a sequence of video frames or audio frames, for example. FIGS. **3***a* and **3***b* illustrate the high level organization of a video bitstream (or video sequence) **300** in accordance with the MPEG II standard. As shown in FIGS. **3***a* and **3***b*, the video bitstream (or video sequence) **300** includes a sequence header **302**, which may be followed by a sequence extension field **304**. The sequence extension field **304** may be followed by an extension and user field **306**, which may be followed by a group of picture header **308**, and optionally, another extension and user field **310**. In any event, a picture header **312** follows the sequence extension field **304** (in addition to any of the other fields). A picture coding extension field **314** follows the picture header field **312**. An optional extension and user field **316** follows. Next, the picture data **318** is provided. More sequences may be provided. Otherwise, the video sequence **300** is ended with a sequence end code **320**. Each section of the video sequence **300** is described in the MPEG II standard. However, for the reader's convenience, the sections particularly relevant to the present invention are described below

As shown in FIG. **4**, the sequence header **302** includes a 32 bit sequence header code field **402** and an eighteen (18) bit rate value field **404**. The sequence header code field **402** is 000001B3 hex and identifies the beginning of a sequence header. The bit rate value field **404** identifies the bit rate of the video bitstream measured in units of 400 bits/second. A twelve (12) bit rate extension field may be included in the extension and user field **310**. Repeating the sequence header in the video bitstream allows data elements of the initial sequence header to be repeated to permit random access into the video sequence.

As shown in FIG. **5**, the picture header **312** includes a 32 bit picture start code field **502**, as well as a ten (10) bit temporal reference field **504**. The temporal reference field **504** is a unsigned integer associated with each input picture. This integer is incremented by one, modulo **1024**, for each input frame. If a frame is coded as two interleaved fields, the temporal reference **504** in the picture header **312** of both fields is the same. Following a group start code **604** in the group of pictures header **308**, the temporal reference field **504** is reset to zero.

FIG. **7** is a high level block schematic showing a system for encoding, communicating, and decoding video and audio data in accordance with the MPEG II standard.

The transport stream multiplexer **712** multiplexes the encoded audio and video packets to form a transport stream **100** and provides the transport stream **100** to communications link **722**. At a remote end of the communications link **722**, a transport stream demultiplexer **724** receives the multiplexed transport stream **100**.

Based on the packet identification (or PID) number **114** of a particular packet, the transport stream demultiplexer **724** separates the encoded audio and video packets and provides the video packets to a video decoder **730** via link **728** and the audio packets to an audio decoder **734** via link **732**. The transport stream demultiplexer **724** also provides timing information to a clock control unit **726**. The clock control unit **726** provides timing inputs to the both the video decoder **730** and the audio decoder **734** based on the timing information provided by the transport stream demultiplexer **724**. The video decoder **730** provides decoded video data which corresponds to the video data originally provided to the video encoder **702**. Similarly, the audio decoder **734** provides decoded audio data which corresponds to the audio data originally provided to the audio encoder **714**.

As mentioned above, transport streams **100** permit one or more programs with one or more independent time bases to be combined into a single stream. That is, a transport stream **100** may include a first program and a second program. In presently contemplated systems, both the video decoder **730**

and the audio decoder **734** must be reset before decoding a next program, for reasons which will be explained below. Thus, for example, in such systems there must be a temporal gap (e.g., one second) between the decoding of the first and second programs to permit the video and audio decoders **730** and **734**, respectively, to be reset. This temporal gap precludes the playing of the second program directly following the first program. Moreover, it is difficult to determine when one program ends and another begins in real-time. Thus, a method and/or a device is needed to permit more than one program to be played (i.e., decoded) back-to-back. The method and/or device should also overcome, or avoid, the difficulties of determining program boundaries in real-time.

Thus, as can be appreciated from the above discussion of MPEG and MPEG II video encoding, the video decoder **730** often needs past and future frames to decode a picture (B-Picture) frame. If the last temporal (displayed) frame of a first program is used in decoding a first temporal (displayed) frame of a second program, or if a partial video frame is used, the output of the video decoder **730** will have been improperly decoded, disadvantageously causing video artifacts. Thus, as discussed above, the decoders must be reset between programs in known systems.

SUMMARY OF THE INVENTION

Specifically, the present invention provides a method for preprocessing multiplexed streams of packets of packetized, encoded, audio and video sequences such that an audio decoder can decode the encoded audio sequence to produce an audio sequence and a video decoder can, without being reset, decode the encoded video sequence to produce a video sequence. The method of the present invention (i) verifies that the multiplexed stream complies with an encoding standard, (ii) preprocesses packets of the packetized, encoded, video sequence such that no video artifacts are produced when the video decoder decodes an adjacent encoded video sequence, and (iii) preprocesses the packets of the packetized, encoded, audio data sequence such that its start time is within a first predetermined time of the start time of the video sequence and its temporal length is within a second predetermined time of the temporal length of the video sequence.

The step of preprocessing the packets of the packetized, encoded, video sequence preferably includes (i) deleting any video frames that cannot be decoded if video frames of the video sequence are not temporally correct, and (ii) deleting any video frames following a code indicating an end of the encoded video sequence. The step of preprocessing the packets of the packetized, encoded, audio sequence preferably includes (i) removing any partial audio frames, (ii) adjusting (i.e., adding or deleting) the number of audio frames, if necessary, such that the audio and video sequences start within the first predetermined time, and (iii) adjusting (i.e., adding or deleting) the number of audio frames, if necessary, such that the temporal lengths of the audio and video sequences are within the second predetermined time.

FIG. 6 illustrates the structure of a group of pictures header of the MPEG II video sequence of FIGS. 3*a* and 3*b*.

FIG. 7 illustrates an encoding, transmission, and decoding system envisioned by MPEG II.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 2 is a diagram which illustrates the syntax of an MPEG II PES packet.

FIGS. 3*a* and 3*b* illustrate the organization of an MPEG II video sequence.

FIG. 4 illustrates the structure of a sequence header of the MPEG II video sequence of FIGS. 3*a* and 3*b*.

FIG. 5 illustrates the structure of a picture header of the MPEG II video sequence of FIGS. 3*a* and 3*b*.

5

* * * * *

MODIFICATION OF BOWATER, ET AL. PATENT REQUIRED BY REJECTION OF CLAIMS IN THE EXAMINER'S ACTION DATED MARCH 18, 2003

FIG. 1

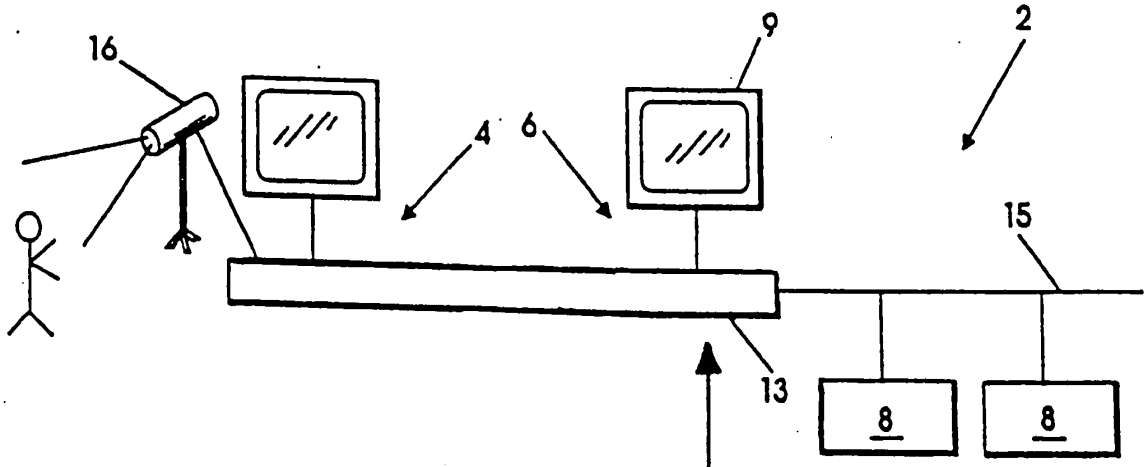
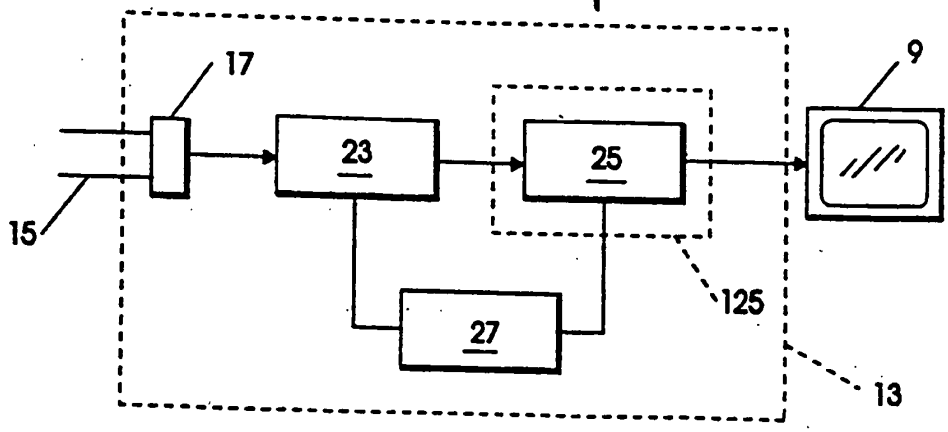


FIG. 2



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